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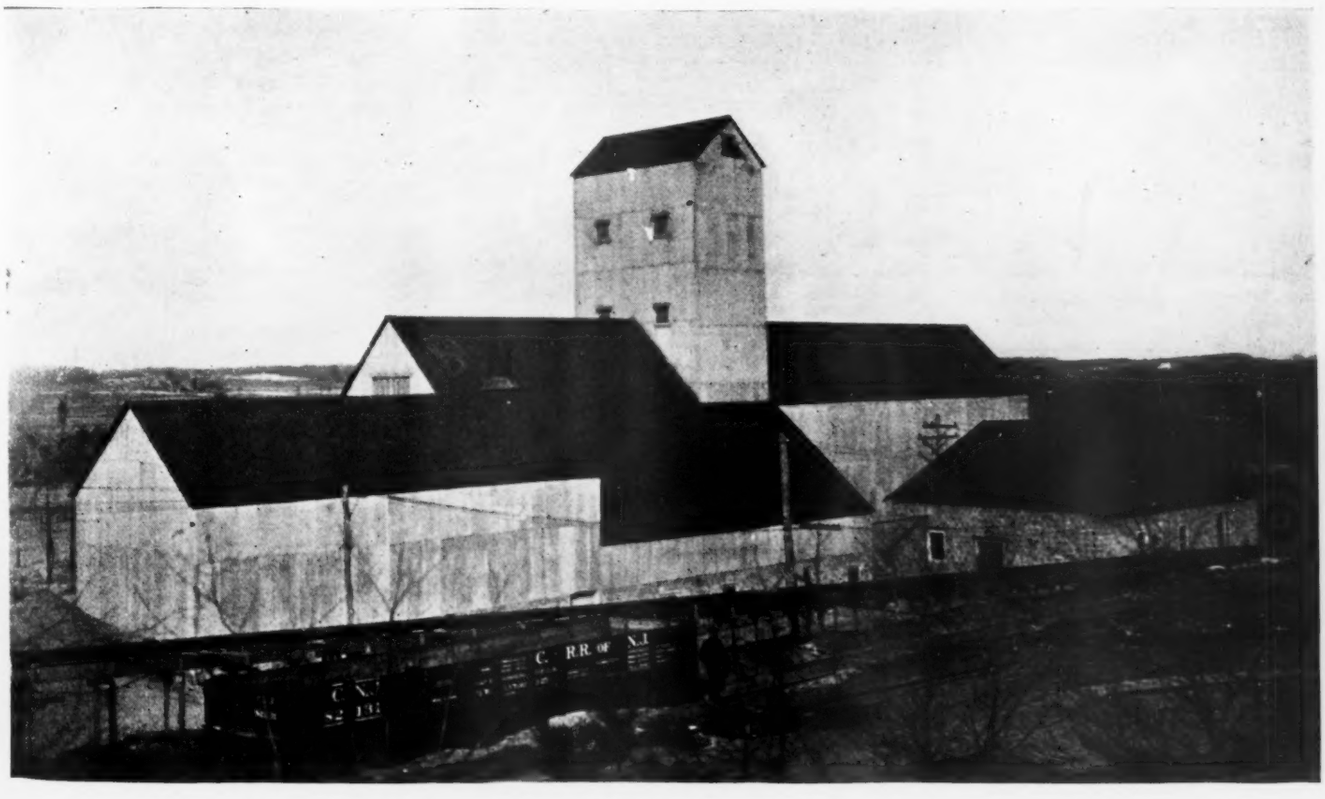
Modern New Jersey Blast-Sand Plant

New Spring Lake Plant of the Bennett Gravel Company Is Specially Designed for Producing Sand for Special Purposes—Diesel-Engine Powered

THE Bennett Gravel Co. of Spring Lake, N. J., has operated a sand and gravel plant near Farmingdale, N. J., for a number of years.

Recently the company has built a plant for the production of blast sand and filter sand. Before the building of this plant, John M. Braley, who is an engineer as well as the manager of the company, spent a considerable time in studying the methods of producing special sands and the resulting plant shows that more than ordinary attention has been given to the details of the design in order to have the plant function with certainty and with the least amount of labor and supervision.

The building is a handsome one, wholly constructed of steel and concrete, as is getting to be the rule with rock products plants of the better class. The concrete is mainly in the form of "Duntile" which the company manufactures at a plant in Spring Lake. These tile are used both for the walls of some of the buildings and for the bins of the silo type which are housed in the main structure. The building is roofed with red concrete tile making it a fireproof



New blast-sand plant of the Bennett Gravel Co., Spring Lake, N. J.; dryer house at left, screening tower and silo building in center and new power house, right

Dryer for blast sand; automatic stoker

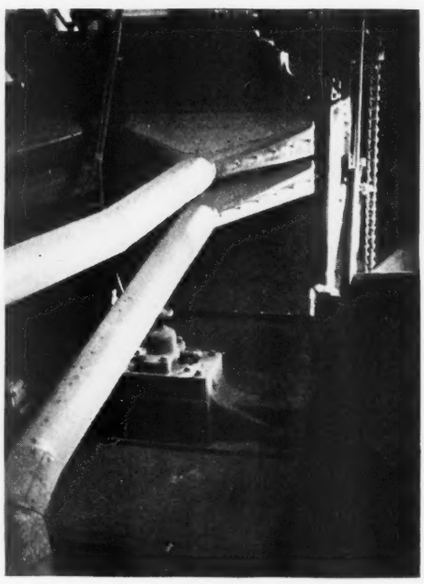
as well as a very durable structure.

The actual preparation of the blast sand begins in the washing plant. The sand, both that which is sold for concrete sand and that which is to be made into special sands, is caught in two dewatering classifiers made by the Allen Cone Co. of El Paso, Texas. The one of these, which produces the greater part of the blast sand, is fitted with a special hydraulic water device that introduces a rising current of clear water in the body of the sand tank. This aids greatly in removing the finer sizes of sand which are not wanted in the blast sand. It costs considerable to dry and screen the sand so it is important to remove as much as possible of the sizes which are not wanted before drying.

The classifying of special sands before drying is unusual but not altogether new. The introduction of hydraulic water decidedly helps the process, and Mr. Frostick the plant superintendent, says that very little of the unwanted fine sand remains in the product of the Allen sand tank which has the hydraulic water attachment.

The dewatered and drained sand is taken by cars to the blast sand plant and unloaded into the plant hopper. From this it is elevated and conveyed to the dryer, made by the Bartlett and Snow Co., Cleveland, Ohio. This is a revolving cylinder dryer and it is fired with an underfed stoker made by the same company. The whole dryer and the furnace is bricked in to conserve heat and to render the work of the dryer more uniform.

After leaving the dryer the sand is elevated and conveyed to the screening plant which is in the central tower shown in the photographs of the building. Hum-mer screens are used throughout. There are two



Single-deck vibrating screens and chutes to silos

double deck and two single deck screens, all 6x3 ft. and covered with Tyler double crimped wire cloth. These make five sizes of blast sand which are given the ordinary trade numbers, Nos. 0, 1, 2, 3 and 4.

The sand falls from the screens to metal chutes and runs by gravity to the silos nearest the screens. The others are filled by a screw conveyor and a belt conveyor. These silos are of concrete "Duntile," a form of tile which has a central core hole. Rods were run through these holes as the tile were laid and then grouted in, giving vertical reinforcing. Hoops laid in a groove and grouted in give reinforcing to resist outward pressure.

From the silos the sand is loaded into tight box cars for it has to be kept dry during shipment.

Power is supplied not only to the blast sand plant but to the washing plant by a 100-h.p. Fairbanks-Morse Diesel engine. This is connected to a generator of the same make and power is transmitted to Fairbanks-Morse motors placed wherever needed. Some of these displace Fairbanks-Morse type Y engines which were installed when the plant was built. The D. C. Jones Manufacturing Co.'s speed reducer is used for reducing motor speed to that demanded by the various machines.

A great many improvements have been made in the washing plant during the past year. Hum-mer screens have been installed in the place of rotary screens, and Allen sand tanks, as noted, have been installed for settling sand. The Dull cones formerly used for all sand collection now are used to settle the fine sand that overflows from the Allen sand tanks. This fine sand is sold as mason's sand.

There are three Hum-mer screens in the washing plant, one of 1-in. square mesh and two of ½-in. square mesh. The oversize of these screens is sold for highway gravel, the intermediate product, between the ½-in. screen and a ¼-in. screen over which the ½-in. undersize flows on its way to the sand tanks, is sold for making concrete products. The sand which is collected and not used for blast sand or mason's sand is sold for making concrete for highway work and other purposes.

In the pit a 1¼-yd. Northwestern gas shovel with crawler tread has been installed. This has an 80-h.p. Twin City engine and its performance is reported to be very satisfactory as compared to a steam shovel which it displaced. Not only is less labor required but the saving of time and effort in getting coal and water to the shovel amounts to considerable. Gas has also dis-

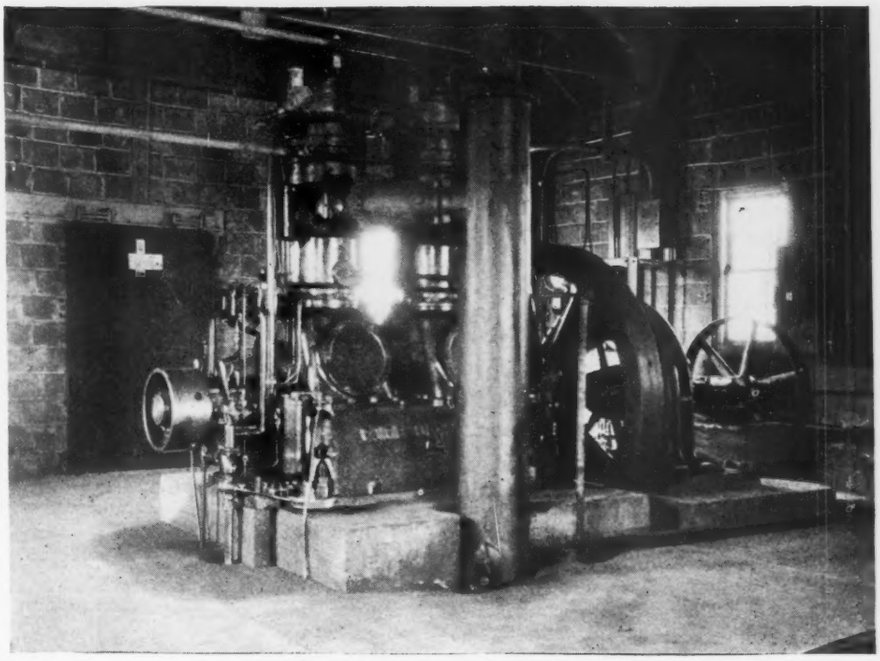
Double-deck vibrating screens and discharge chutes

placed steam in hauling in the sand and gravel to the plant and two 8-ton Plymouth locomotives have recently been added to the equipment.

To attend to these two and the shovel a regular gas filling station has been set up in the pit not far from the working force. A very neat painted shed houses the locomotives when they are not working. A new office building with stuccoed walls and tiled roof has also been added.

The deposit worked by the Bennett Sand and Gravel Co. is highly silicious as are all of the deposits in that part of New Jersey. Both sand and gravel are almost white in color and the grains and pebbles are well rounded from water action. The roundness and firmness is what makes these grains of great value for sand blasting since they do not break readily when they are used for that purpose.

William Frostick is in charge of the plant. The office of the company is at Spring Lake, about 12 miles from the plant. T. H. Bennett is president, John M. Braly, secretary, and C. H. Lawrence is treasurer.



Prime mover is 100-h.p. Diesel engine

Graham Bros. Company Puts New Barge Into Service

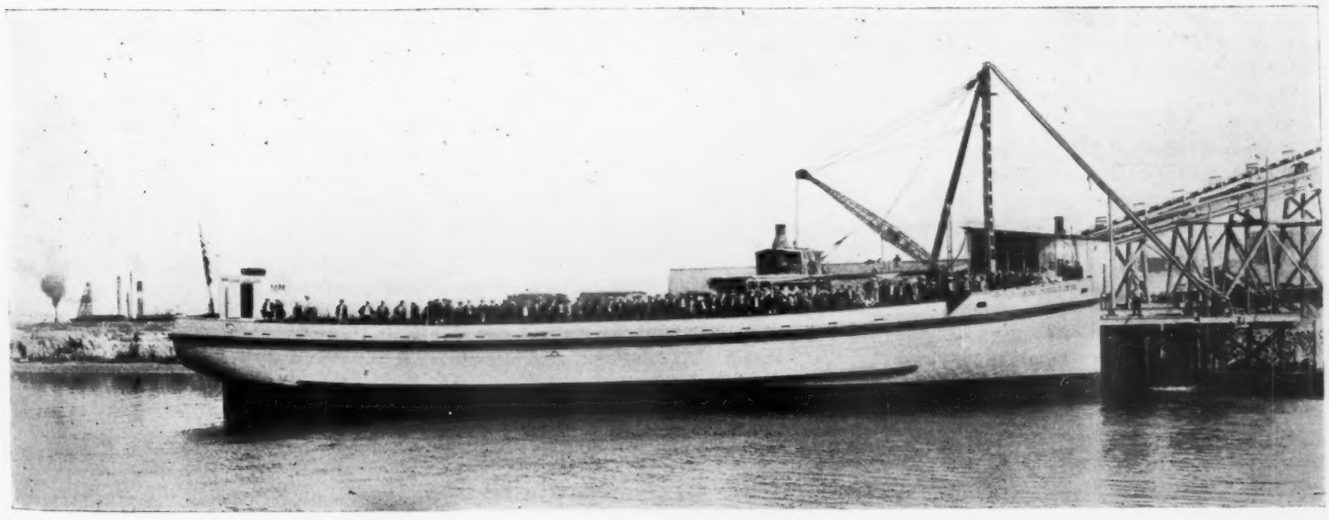
DESIGNED and built especially for cross channel service between Long Beach harbor and Catalina Island, a new 1000-ton capacity barge, known as the "William Muller," was placed into service by Graham Bros., on Saturday, August 1. The new craft is 146 ft. long by 39 ft. wide and has a 12-ft. draft.

Close to 200 local contractors were aboard the new lighter on its initial voyage to the island, enjoying an all day's outing as the special guests of Graham Bros. Towed by the Wilmington Transportation Co.'s tug, "D. M. Renton," the barge left here at 9 a.m. and arrived at Avalon at 12:30 p.m. There the guests on the trip were met by special busses and driven to "Pebble Beach" for lunch, following which they inspected Graham Bros.' Catalina rock quarry and witnessed the first loading of the new barge. Returning to Wilmington on the steamer Catalina, the party boarded a special Pacific Electric train and arrived back in Long Beach shortly after 7 p.m.

Paul Graham, D. M. Murphy, superintendent, and Bill Gowan, sales manager, were the hosts of the party. On the trip over to the island, the barge was equipped with a huge sun canopy and special entertainment and music was provided by Albert V. Steffen, former big-time vaudeville star, and Morris Paul, Joyce Aldahl and Ansel Beldon.

During their luncheon at "Pebble Beach" the guests were addressed briefly by D. M. Renton, manager of the Santa Catalina Island Co., and under whose direction practically all of the recent island improvements have been made. He took occasion to voice approval of the foresighted policy of Long Beach's city officials in furthering harbor improvements and particularly lauded the efforts of City Manager C. H. Windham in that regard.

The new barge cost $50,000 and was built by the Wilmington Transportation Co. for the exclusive use of Graham Bros. Nearly twice as large as any of the other six barges now in service, it is a model bottom, ocean-going craft, capable of weathering all kinds of bad seas.



New sea-going barge of record capacity for service between Catalina Island crushing plant and Graham Bros. Long Beach distributing bins

Requirements of Special Sands

Description of the Sands Used for Traction, Sawing Stone, Lining Furnaces, Roofing and the Ceramic Industry—A Growing Field for a Basic Commodity

By W. M. Weigel
Mineral Technologist, Department of the Interior, Bureau of Mines

SAND is one of the most useful and, fortunately, one of the most common mineral commodities. By far the largest proportion of the production is used in construction, including all forms of building, concrete and paving. Sand for this purpose is produced in every state in appreciable amounts. Excluding sand used for railroad ballast, molding sand stands next in tonnage produced, followed by glass sand.

Special Sands

In addition to the above, many grades of sands, with special characteristics, are used in industrial processes, and may be classed in a group as "special sands." This includes filter sand, sand blast sand, engine sand, abrasive sand, fire or furnace sand, special flooring sand, roofing sand used as a finish for prepared roofings and pottery placing sand. Sand blast and filter sand have been discussed in other reports.[1]

Very few sand companies depend upon the production of any one of these grades, as their source of revenue. They are generally especially prepared from the bank run of sand by different methods of screening or washing, or may, in some instances, be by-products from the production of other grades. Many companies not now producing them might be able to supply local demands by a slight addition to their plant. In nearly all cases, they command a better price than the usual grades of building sand.

Definitions and Properties

Engine sand, or traction sand, as it is sometimes called, is used to prevent the slipping of the driving wheels of locomotives, or other self-propelled vehicles, on wet or slippery rails. Its greatest use is, of course, for railroad locomotives, but street cars use considerable amounts and mine locomotives require its use. As the sand must be very dry when used, most consumers have their own drying equipment, so it is often shipped damp, with its natural water content or that resulting from washing by the producer.

It must be fairly fine and free from rubbish, leaves, small sticks, or large grains of sand or pebbles that would tend to choke the feed pipes and valves leading from the sand box to the rail. On the other hand, it should contain a minimum amount of dust and very fine particles, which tend to retain or absorb moisture and form lumps. A sand containing clay is unsuitable. As the grains are immediately crushed to a fine powder under the drivers, a fine pulverized silica would give the necessary tractive effect, but such a material would not flow through the feed pipes. Either a rounded or angular grained sand is suitable, except that very rounded grains are more inclined to roll off the rail before being caught under the drivers and be wasted.

The Pennsylvania Railroad System[2] does not have a definite specification for engine sand, but states that it should be high grade, over 95% silica, comparatively free from foreign particles, non-caking and have sharp, clean grains of such size that approximately all will pass a 20 mesh and be retained on an 80-mesh sieve. Table I gives the physical and chemical analysis of four sands used and the source.

The Southern Railway System[3] also do not buy their engine sand to specifications, but test sand from new sources and compare it with sand used that has given satisfactory results. They use as a standard an available sand on their line, which is a quartz sand, practically free from loam and with the following approximate screen analysis:

	Pct.
All through No. 10 and held on No. 40 sieve	40
Through No. 40 and held on No. 80 sieve	55
Passing No. 80 sieve	5

The Chicago, Ottawa & Peoria railway (electric)[4] tried to use a sand from their own pit, but it had a natural bonding property, and also would absorb moisture in damp weather, probably due to the presence of vegetable matter. Its use was abandoned and washed and dried silica sand produced at Ottawa, Illinois, is now purchased. Although the grains are decidedly rounded, the sand gives satisfactory service.

The United Railways Co. of St. Louis[5] use Mississippi River sand after drying and screening through 3/16-in. mesh wire cloth. The excavation from the river, followed by overflow from the barges, gives it a partial washing that removes most of the silt.

The Washington, D. C., street railways and some of the railroads in the vicinity use washed Potomac River sand that is coarser than the ordinary. The screen analysis of a sample is as follows:

	Pct.
Passing 6 mesh	100.0
Retained on 8 mesh	1.5
Retained on 20 mesh	21.1
Retained on 65 mesh	89.6
Retained on 100 mesh	95.8
Retained on 200 mesh	99.5

TABLE I

Examination of Various Sands for Locomotive Sanding Purposes. Altoona, Pa., 2-1-24.
Sieving Test and Chemical Analysis

	No. 1		No. 2		No. 5		No. 6	
Sieving tests	Vineyard, Pa.		Burnham, Pa.		Newberry, Pa.		Menantico, N. J.	
Sieve mesh number	20	80	20	80	20	80	20	80
Per cent passing	99.18	9.53	99.70	9.10	97.40	3.00	99.60	2.20
Per cent retained	0.82	90.47	0.30	90.90	2.60	97.00	0.40	97.80
Color	White		Yellow		Brown		Brown	
Grains	Sharp		Sharp		Medium Sharp		Medium Sharp	
Kind of sand	Crushed Rock		Crushed Rock		River		Lake	
Chemical Analysis:								
	Per cent		Per cent		Per cent		Per cent	
Silica	99.34		99.22		94.62		98.16	
Sesquioxide of iron	Trace		Trace		.....		.....	
Alumina	.....		.....		.....		.....	
Lime	.....		.....		.....		.....	
Magnesia	.....		.....		.....		.....	
Loss on ignition	0.18		0.16		1.02		0.36	
Loss on washing	0.14		0.38		0.51		0.52	
Water soluble	0.01		0.05		0.04		0.03	
Chlorine	Trace		Trace		None		None	
Sulphates	None		None		Present		Present	
Caking test	OK		Fair		OK		Fair	

[1] Bureau of Mines Reports of Investigations No. 2615, "Sand Blast Sand," and No. 2622, "Filter Sand for Municipal Water Supply" (1924).

[2] Private communication.

[3] Private Communication.

[4] Electric Railway Journal, Vol. 45, p. 143.

[5] A New Sand Drying Plant of the United Railway Co. of St. Louis. C. L. Hawkins, Association of Engineering Societies, Vol. 48, p. 61.

Abrasive and Polishing Sand

Abrasive sand includes several grades of products, among which may be classed glass grinding sand, stone sawing sand, banding sand, sand for abrasive papers and various grinding and polishing operations.

Crude, rolled plate glass requires rough grinding to remove inequalities of the surface before it is given the final grinding and polishing. Sand is used for this purpose. The specifications are not strict and the cheapest sand that answers the purpose is generally used; so, in nearly all cases, local supplies fill the requirements. From two to three tons of sand are required to grind one ton of plate glass. The sand should be free from large grains and any rubbish which might tend to choke the pipes in the circulating system. High silicia content is not essential, except that impurities would usually be softer than the quartz grains and hence of no value. Very fine material and clay are objectionable only to the extent that they reduce the amount of proper quartz grains present. Where no other supply is available, the same sand is used for grinding as in the glass mix. One company in the central states, mining their own sand for glass, dry part of their sand for the mix and divert the balance before drying to the glass plant for grinding. All the sand passes 20 mesh, and only a small amount is retained on 28 mesh and 91% is retained on 150 mesh. The sand is a rounded grain product. Producers in the Ottawa, Illinois district, market some of their product for this purpose. This has been screened through 20 mesh. Only the fines removed in washing are taken out.

An impure sand, containing rounded grains of stone which are not quartz, or much mica, is unsuitable. Any large grains, especially of quartz, are objectionable in that they may make deep scratches in grinding that are difficult to remove in the polishing process.

Stone Sawing Sand

Sand for stone and marble sawing should be composed of tough, fairly uniform grains. Flat particles are objectionable and fines are wasted, as the coarser grains support the cutting edge, leaving no work for the finer grains. Many unsorted sands are, however, used for stone sawing on account of their cheapness and ready availability. Some plants use a sand approximately equal to No. 1 sand blast sand, the screen analysis of a sample being as follows: retained on 20 mesh, 0.4%; retained on 35 mesh, 79.6%; retained on 65 mesh, 99.6%.

One large marble company uses a clean, washed river sand, with 3.70% retained on 10 mesh; 12.60% on 20 mesh; 83.8% on 43 mesh, and 98.6% on 100 mesh. At the same time, they state that clean sea sand is superior to the above product, if it were available at a reasonable price, and that stone sawers on the coast usually use sea sand. As the sand is used over and over, grains finer than 100 mesh are eliminated by flotation, as they are considered of little use. Another company uses a sand passing a 1/16-in. mesh screen, and states that the elimination of fines is desirable.

Both round and angular grains are used. One marble sawer advances the opinion that for rounded grains a softer blade should be used than for sharp sand, as it has less tendency to "ride" the round sand.

Sand was at one time largely used for the surfacing of "sandpaper," but very little natural sand is now so employed. The grains of most natural sands, while being more or less angular, or "sharp," do not have the sharp cutting edges of grains broken down from larger fragments, and these sharp edges are especially desirable in wood-working. Material of the proper sizes, screened out in the crushing of rock quartz, is still used to some extent. Sand and quartz grains have been largely replaced by garnet and the artificial abrasives in the manufacture of abrasive paper and cloth, due to their better cutting qualities and greater toughness or resistance to breaking down of the individual grains.

Abrasive sand for the rough grinding of stone and marble on the rubbing beds is generally employed. Sharp, angular grains are considered best, but, as the sand is used over and over, and the larger grains soon broken down, a rounded grain sand should answer equally as well, as in fracturing, the round grain yields small, sharp grains. Different stone and types of finish require different grades of sand. For all work, however, large grains and pebbles should be screened out and an excessive amount of fines reduces the efficiency. Other things being equal, a high silica sand is best and one with hard, tough grains which will not readily break down.

Banding sand is one of the minor grades of abrasive sands. It was formerly largely used in the grinding, and especially, the beveling of plate glass, but has been replaced to some extent by the more rapid cutting artificial abrasives. This grade of sand is also used in the manufacture of some prepared roofings, where a very fine sand is desirable. It is produced as a separate grade in the Ottawa, Ill., district. The screen analysis of samples obtained from two producers is as follows:

	—Sample No.— 366, Pct.	370, Pct.
Retained on 35 mesh	4.0	3.1
Retained on 48 mesh	34.7	15.1
Retained on 65 mesh	71.8	60.6
Retained on 100 mesh	94.0	92.1
Retained on 150 mesh	99.3	99.0

Furnace Sands

Fire or furnace sand is the silica or sand used to line furnace bottoms and walls, especially in those furnaces making acid open hearth steel. A high silica content is essential, and such sand is usually called "silica sand." A small amount of bonding material is required to hold the sand in place until it has been fired or "burned in." If the sand is so pure as to be lacking in any bonding property, some bond, such as a plastic fire clay, is usually added. Many sands used for this purpose have sufficient natural bond in the form of silicates and iron oxide, usually present as limonite. A sand graded from coarse to fine is used. A small amount of fine material is desirable, as it assists in bonding, fills voids between the larger grains and makes a more impervious hearth. Also the finer grains sinter more rapidly when firing the new hearth. Prepared, screened sands are often used, in which there are no large grains. Apparently, however, large pieces are not objectionable in all cases, as some producers market a crushed sandstone which has passed a 2 mesh[6] screen (about ⅜-in.) The screen analysis of several typical furnace sands is given in Table II. Sample No. 364 is used first as a steel molding sand by a Pennsylvania steel foundry, and the spent molding sand is then used as furnace sand for the bottoms of the open hearth steel furnaces. This spent sand is No. 363 in the table. No. 364 is the original washed sand, and the increase in fines in No. 363 is due mostly to the clay bond that was added for molding purposes. This spent sand was said to give better service than new sand. About 200 heats are obtained with bottom. From the table, it is evident that a considerable range in size is permissible, as long as the material is well graded from coase to fine.

TABLE II—SCREEN ANALYSIS OF FURNACE SANDS

Number	300	341	342	343	363	364
Source	New Jersey	Ohio	Ohio	Ohio	Pennsylv'a	Pennsylv'a
Per cent retained on 4 mesh	.....	.....	9.50	.....	.....	.....
Per cent retained on 10 mesh	.....	0.70	14.20	2.00	1.10	.....
Per cent retained on 20 mesh	.....	2.90	16.90	7.30	2.20	1.00
Per cent retained on 35 mesh	0.80	28.70	37.50	34.50	7.90	8.50
Per cent retained on 65 mesh	19.30	82.40	79.30	81.00	65.50	68.10
Per cent retained on 100 mesh	78.40	94.32	92.60	93.50	82.10	87.90
Per cent retained on 200 mesh	95.80	98.80	99.20	99.00	89.40	97.20
Passing 200	4.20	1.20	0.80	1.00	10.60	2.80

Chemical analysis is important as effecting the refractoriness of the sand. Alkalies should be at a minimum. This eliminates sands containing much feldspar and mica. Clay is the best bond and the least objectionable impurity. Small amounts of iron oxide are not objectionable and probably play an important part in the bond.

[6] "Silica Sand Plant of Newest Type." Rock Products, Dec. 29, 1923, p. 77.

As low as 80% silica sands have been used in extreme cases[7], but a silica content in excess of 95% is usually specified. Sample No. 342, Table II, has the following analysis:

	Per cent
Silica	97.27
Alumina	0.80
Iron Oxides	0.52
Other Oxides	0.75

Flooring and Roofing Sands

Special flooring sand is used in asphalt mastic flooring. This flooring material is made up of asphalt cement, a sand aggregate and a fine, absorbent mineral filler. The Federal Specifications Board has the following specifications for this sand, when intended for government use: "The mineral aggregate shall be sand and small gravel. It shall be clean, hard grained and free from clay, silt, organic and other foreign matter, and shall be properly graded from coarse to fine, so as to produce a mixture of greatest density and stability. It shall fall within the following limits:

	Pct.
Passing a No. 3 screen	100
Total passing a No. 8 screen, not over	60
Total passing a No. 30 screen, not over	40
Total passing a No. 100 screen, not over	7.5

Chemical composition is not specified.

Roofing sand as here defined, is the sand used in coating prepared roofing and not the material applied to roofs built up in place. Only white sand is suitable for this. A rounded grain product is desirable but sharp grained sand is used.

One manufacturer uses a fine, white sand of the following size:

	Pct.
Retained on 40 mesh	1.5
Retained on 60 mesh	72.5
Retained on 80 mesh	89.0
Passing 80 mesh	11.0
	100.0

Another large manufacturer uses sand from two sources, with the following approximate screen analysis:

	A		B	
	Min. Pct.	Max. Pct.	Min. Pct.	Max. Pct.
Through—				
20 mesh	98	....	98	....
20 mesh on 28 mesh	20	30	10	15
28 mesh on 35 mesh	35	50	20	30
35 mesh on 48 mesh	20	30	25	35
48 mesh on 65 mesh	0	10	5	20
65 mesh	....	5	....	....
65 mesh on 100 mesh	....	....	5	15
100 mesh	....	....	....	10

Both of these are rather uniformly graded sands, B being the finer, and either of them would answer the physical requirements for a good glass sand.

Sand in the Ceramic Industry

Placing sand is used in the ceramic industry by manufacturers of white ware, wall and floor tiles, heavy clay products and refractories, as a packing in the saggers and between the shapes to keep the ware apart. It is of two general types; first, that used for white ware and refractories, which must be low in iron and other easily fusible or fluxing minerals. Sand for dark, heavy clay ware need not have such high purity. In addition, there are two general grades, coarse and fine, the coarse running from about 10 to 40 mesh and the fine from 28 to 100 mesh. One sample of finer grade gave 2% on 28 mesh, 42% on 48 mesh and 67% on 65 mesh. A good grade of glass sand would be suitable for most work. Extreme uniformity of grain is not essential, but coarse particles and dust are objectionable.

Preparation of Special Sands

Any one kind of special sand is seldom the entire output of a producer. It is more often a by-product, or side line, from the production of standard sands marketed in larger amounts. For this reason, the method of mining or excavation of special sands does not differ from those generally employed.[8]

All engine sands are screened to remove foreign material and oversize grain. In addition, most of them are washed, which is sufficient to remove the excess fines. Sand No. 6, Table I, is the screenings removed from sand blast sand. The original sand has been double washed, so nearly all dust and fines have been removed. Another New Jersey plant markets some of its screenings from sand blast sand as engine sand. This is also a washed product. At St. Louis,[8] the pumping of the river sand into barges permits the overflow of clay, silt and a large part of the fines. The wet sand is then hauled in railroad cars to the drying plant and dumped in concrete bins. These feed to a conveyor, delivering to a 4 feet by 20 feet rotary, direct heat drier. Moisture content of the wet sand was 3¼%. The capacity of the drier was 12 tons per hour, with a coal consumption of 1 ton per 73 tons of sand. The dried sand was screened over a 3/16-in. wire mesh on a rotary screen.

Abrasive Sands Not Accurately Sized

Abrasive sands, with the exception of sand blast sand and the small amounts used for coating paper and cloth, are not closely sized. Large grains and foreign matter are always objectionable, however, so it is almost universal practice to pass the sand over one screen to remove these. Banding sand in the Ottawa, Illinois, district is the finer portion of the sand obtained through vibrating screens in the preparation of sand blast and filter sand. Sand, or crushed quartz, for abrasive papers, must be very closely sized into the different grades. This operation is not carried out by the sand producer, as the manufacturer prefers to keep this operation under his control and supervision.

Stone sawing sand is generally the quarry run, with large lumps screened out. However, some consumers prefer a sized product, about the same as No. 1 sand blast, as their tests have shown it to be more efficient, even at a slightly higher price. This is separated on screens, generally of the vibrating type, after the quarry run sand has been washed and dried.

At the different plants visited, there was noted a decided tendency toward the adoption of the electrically operated, rapidly vibrating screens, to displace the older rotary and stationary sloping type. One advantage is that they lend themselves to incorporation in dust collecting systems, which materially improves the working and health conditions, where dry screening is done.

Not Necessarily a Localized Industry

The use of the various special sands is not restricted to any one locality or industry. For this reason, it is believed that many sand producers now only putting out one grade of ordinary sand could, by the installation of suitable equipment, be able to supply local demands in one or more grades. Specially prepared sands command a better price than the ordinary quarry run of building sands, and a market of this kind would tend to level off the seasonal peaks of building demands.

Some sand deposits vary in character in different parts of the bed, so that certain portions may be unsuitable for general use, but might serve as a source of some of the grades here mentioned. Often these portions can be mined and handled separately. This practice was observed at several plants visited. At one New Jersey lake deposit, the sand is coarser on one side and contains much gravel, which is also handled as a major part of the product. The other side of the lake contains mostly fine sand, so two dredges are employed, each pumping to a separate washing and screening plant, one for the coarser sands and one for the finer.

Considerable difference of opinion exists as to the relative merits of round grained and angular grained sand, especially for abrasive purposes. The fact remains that both kinds are used for all purposes and doing the work required of them. So it is believed that, if prepared with equal care to the same specifications, there is little difference in their performance, if the grains are equally tough. It must be said, however, that, while the individual grains of most of the rounded sands are tough and free from flaws and microscopic cracks, a few of the angular grained sands have grains which break down more readily under impact, or shear, and hence are consumed, or "wear out" more rapidly, requiring more frequent replacement.—*Reports of Investigations, Department of the Interior, Bureau of Mines.*

[7] "Refining Metals Electrically." The Foundry, Aug. 15, 1924, p. 642.

[8] "Sand Blast Sand:" Bureau of Mines Reports of Investigations, No. 2615.

Where Sand Is Found Ready for the Market

THE simplest of sand operations to be conducted by a regular producing company is that which is carried on by the Alfred Sand and Gravel Corp., of Hornell, N. Y. Hornell is one of the principal towns on the Erie railroad between New York City and Buffalo, not far from the Pennsylvania line.

The reason for the simplicity of the operation is the nature of the deposit. Nature has washed and even graded the sand so that all that has to be done with it is to cave it down and load it for transportation.

Such deposits are not unknown in other parts of the country. Usually they are one form of what geologists call an esker. Eskers were made from glacial sand and gravel when the great ice sheets of the Pleistocene era had begun to melt. Streams of water from the melting ice flowed under the glacier and in some cases these streams had sufficient pressure to burst through a thin place in the ice, rising vertically and carrying with them sand and in some cases gravel. Of course this sand was settled in an area surrounding the hole from which the stream emerged and gradually built up a hill in the center of which was a vertical channel through which the stream rose. Season after season the work went on, the sand deposited each season showing as a distinct layer. It is by a study of these seasonal deposits in eskers that geologists have been able to give the time in years for much that went on in the age of glaciers.

Such an esker is a hydraulic classifier on a large scale and it not only washes but grades the sand. As no clay is deposited with the sand the sand is clean. In fact there is nothing to do to it to prepare it for the market.

The Alfred Sand and Gravel Corp. works a deposit of this kind by caving down the sand from the bank, loading it into trucks with a Barber-Greene loader and then hauling it to the railroad. The loader is provided with a grizzly to keep out sticks or any accidental foreign material that might get into the sand, and this is the only screening that is necessary.

The most expensive part of the operation is the truck haulage, as the distance from the bank to the loading point on the railroad is about a mile. The company intends to substitute an aerial tramway, made by the Interstate Equipment Co., for truck haulage. Once the tramway is installed the expense of delivering to cars on the railroad will be reduced to about 10% of what it costs to haul the sand by truck.

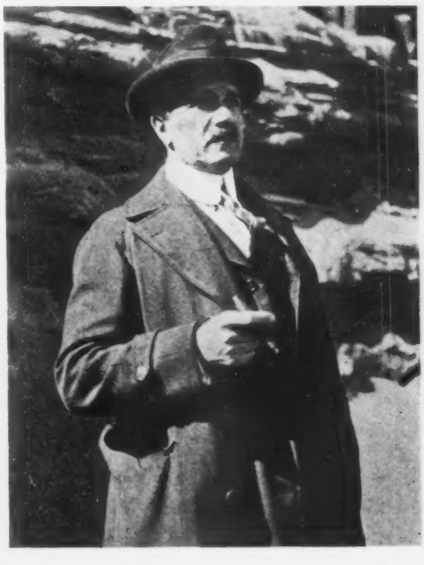
The company has a very large holding, including a deposit on the railroad, which could be washed to an excellent quality of sand and gravel. But naturally, it prefers to work the deposit it has opened, as the expense of washing is saved. Its customers prefer it because the sand is dry. A considerable amount of the production is used in state highways, both in New York and Pennsylvania.

At present the production is about 1,000 tons daily. The loader has a capacity of 120 tons per hour, and this production has been carried on continuously several times.

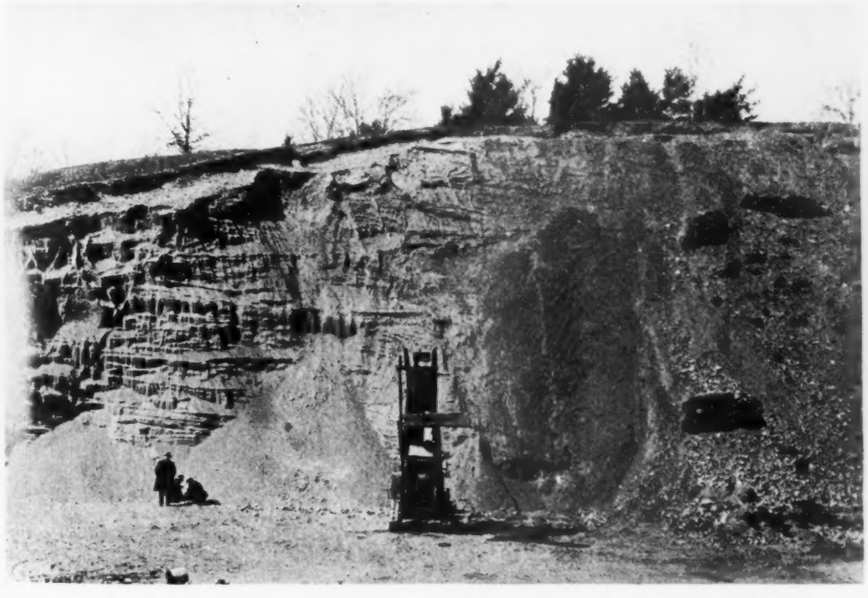
The office of the company is at Hornell. William J. Schweiger is president of the company and Frank W. Sterrett is secretary-treasurer. Mr. Schweiger is an engineer and was formerly employed in the planning and construction of some of the large under-river tunnels and sewers in Chicago and New York, aiding in the development of the Hastings Shield, which is used in this work.

Face of the deposit

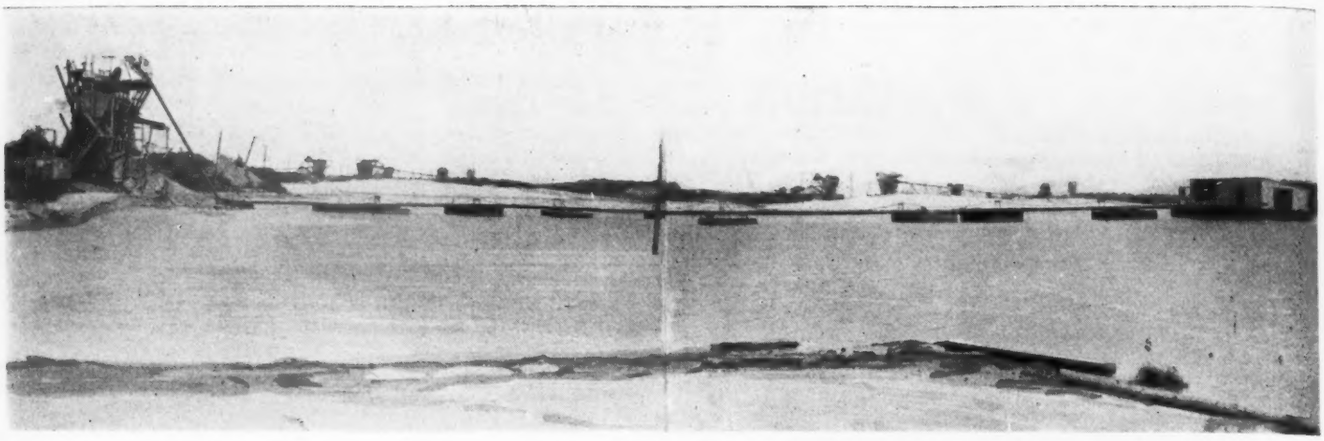
Since the plant was visited in April, the company writes that the output has been increased. Another 21-ft. by 24-in. Barber-Greene loader has been installed and a 66-ft. portable belt conveyor of the same make. A jaw crusher is being installed at a gravel deposit nearby which is being worked in connection with the sand deposit.



William J. Schweiger



The bank is caved down and then loaded into trucks by the wagon loader



Typical sand and gravel operations of the Lyman-Richey company on the Platte river in Nebraska

The Aggregate Industry in Nebraska and the Dakotas

Scientific Study of Grading Sand at Omaha Overcomes Natural Handicaps—The South Dakota Hard Rock Industry

By Edmund Shaw
Editor, Rock Products

OMAHA, in common with the other larger cities in the states just across the Mississippi, has been doing an increased amount of building this year. The newspapers published a survey while I was in the city which showed that building in 1925 already exceeded total building in 1924 by 50%. The rock products industries of course are finding this a good year.

The aggregate industry in the Omaha district is confined to two or three quarry operations which mine limestone and the large business of the Lyman-Richey Sand and Gravel Co. The stone mining operation has been pretty well covered by ROCK PRODUCTS recently (see the issue for December 13, 1924, describing the National Crushed Stone Co.'s mine and plant), so this plant was not visited. A description of the sand and gravel business however will doubtless be new to readers, since practically nothing concerning it has appeared in any of the technical press.

A fuller account than the following will be published later in the special articles. Briefly, one may mention that the Lyman-Richey Sand and Gravel Co. is among the very largest producers in the country, operating 25 plants and sometimes shipping as much as 400 cars a day. But of still greater interest is the fact that 75% of its output is a product that is not known elsewhere. That product is called *"sand-gravel."*

This material was produced as the result of a systematic laboratory research. There was a real need for more concrete aggregate than stone mining could supply, especially after concrete highways began to be

New type of movable shore plant developed recently by the Lyman-Richey Sand and Gravel Co.

built. The deposits along the Platte and Missouri rivers contained no gravel except that composed of pebbles between ¼-in. and ¾-in. found with a great deal of sand and mostly at considerable depth. It would have looked like a hopeless case to the concrete engineer or sand and gravel producer who was familiar with only ordinary materials, used elsewhere.

The Lyman-Richey company however, had a conviction that by experimenting they might find a grading that would give the strongest concrete possible from such material, and that when they had found it they would also find that it would compare favorably with other aggregates in cost and quality. They employed Roy M. Green, manager of the Western Laboratories, Lincoln, Neb., to work this out for them. Mr. Green was thoroughly familiar with concrete, both from the practical and theoretical sides, for he had taught in an engineering school, besides having had considerable outside experience. He knew that the solution of the problem lay in finding the grading that would give the lowest water-cement ratio for a workable mixture, and he found it by screening the sand and fine gravel which came from the pits of the company and recombining in various proportions. Of course this was a long and tedious job as in work of this kind only one variable at a time can be studied and each variable has to be changed by small increments.

As a result a grading was worked out that gave a considerably lower water-cement ratio than would be given by the Abram's formula based on the modulus of fineness. This statement is true for the mixes richer than one part of aggregate to five or six parts of cement. For the 1 to 6 mixture the formula and the experimental water-cement ratio are the same. Hence for the 1 to 4 and 1 to 4½ mixes, used in highway and reinforced concrete work, the grading made a thoroughly satisfactory aggregate, which gave the required strength and the desired economy of cement.

In doing this work the Lyman-Richey company has done for itself and for its own particular field of operation what the National Crushed Stone Association and the National Sand and Gravel Association are preparing to do for the whole country, that is, to study the uses of these products through specialists, both in the laboratory and the field, and instruct the users, the engineers, architects and contractors of the country, in the employment of their products in the most economical way.

I visited the quartzite quarry of the Wisconsin Granite Co. at Sioux Falls, S. D., and that of the same company at Dell Rapids, S. D., and the Simpson Co.'s quarries at Dell Rapids. Practice in all these is much the same. The face of the ledge is about 40 ft. high and it is well drilled and shot down as a limestone ledge would be except that 60% dynamite is used, and more of it, than would be necessary in limestone. The Sioux Falls plant has a large jaw crusher for its primary breaker, but all the other crushers in the district use gyratories. Owing to the abrasiveness of the rock the crushers have to be set up every six or seven days.

It is rather astonishing to find a crushed stone business of this kind, working a rock that is very expensive to quarry and crush, with practically no local market to take its product. The three quarries visited produce something between 300,000 and 400,000 tons a year and probably 30,000 tons would supply all the local market. South Dakota has built only one mile of concrete road to date, so there is no market for the rock for local highways.

But outside points take a lot of it. Each spring many carloads (not counted in the above tonnage) of one-man-stone rip-rap are shipped to points where railroads and municipalities are protecting the banks of rivers. A new use for stone of this size has just been found which is for the walls of houses put up by the Flagg system. As aggregate and similar material it is shipped as far east as Minneapolis and St. Paul and as far south as Kansas City. Sioux City, of course, uses a lot of it. As stucco aggregate it is shipped all over the United States, a lot of it being used in the suburban districts of New York, Cincinnati and Wash-

Riverside Sand and Gravel Co.'s plant near Mandan, S. D.

Crushing plant of the Simpson Quarry Co., Dell Rapids, S. D.

Sioux Falls Granite

The quartzite referred to is generally called "Sioux Falls granite" and it has been known by that name for a number of years. The same rock is quarried in Minnesota at Jasper and Luverne. It is a very hard rock with a crushing strength of 52,000 lb. per sq. in. and it is exceedingly abrasive. The French coefficient of wear varies from 17 to 19 at different quarries, so it can be seen that it is expensive both to quarry and to crush.

However, it has qualities which render it valuable for many purposes. One of these is its color which is a strong red in a large piece and rose color when it is broken down to stucco aggregate size. The dust from it however is as white as "patent" flour.

It has also the same fire resisting qualities that is shown by the Pennsylvania quartzites which are quarried and sold under the name of "ganister rock" for making silica brick and other refractories and ferro-silicon.

ington D. C. As ganister for furnace lining and for making ferro-silicon the fines are shipped to the steel plants near Chicago. And finally the dust which is collected by the fans which were originally placed in the plants to protect the workmen, is a source of profit, for it is sold at a good price to the makers of scouring soaps and cleansers.

Originally the quarries of this section were worked for building stone, but as the building stone business declined the owners had the initiative and the courage to develop new markets for their products. And this may stand as another example which shows the value of studying the product from the point of view of the user.

Sioux City is without rock products industries for the excellent reason that there is nothing of which to make them. The city is built on hills of loess earth, which is only fine wind-blown dirt, supposed to have come originally from the sand bars of the Missouri and other rivers. It is 200 ft. thick in some places. Being fairly high in lime this loess grows alfalfa and other crops very well. The same is true of the soils above the quartzite at Sioux Falls, which some say are of glacial origin.

But around Sioux City are plants which supply it with some concrete aggregate and similar material. I was told the principal plant of this kind was the sand and gravel plant at Quimby, Iowa, although there is a good sand and gravel operation at Haywarden. And of course the quartzite quarries in both Minnesota and South Dakota contribute their share so that the city's needs are well supplied.

But Sioux City is of interest to the rock products man, as it was one of the pioneers in the laying of concrete pavements, beginning back in 1909, when such pavements were purely experimental. T. H. Johnson was at that time city engineer and he became very much interested in concrete paving, working out a system that he has since used in pavements in many towns and cities. Some of the earlier pavements, put down in 1911 and only 5 in. thick, are still standing up under heavy traffic and show very little cracking.

At St. Paul I visited the state highway department, which is housed in a fine new building, to get a line on such of the rock products industries of the state that are connected with the highway work. F. C. Lang, chief testing engineer, furnished the information. There is one portland cement plant in the state, the Universal plant at Duluth. Natural cement is made at the Carney plant in Mankato, but no attempt has been made to use it for highway paving. As for aggregate, the state is abundantly supplied. In the southeastern part there is a corner that the glaciers did not touch which is deeply eroded, exposing the Platteville limestone (Ordovician) and the same stone is exposed near St. Paul and Minneapolis. Large tonnages of crushed stone come from these ledges. In the northeast are the Kettle River sandstone, which is somewhat used as aggregate, and the igneous rocks, gabbros and granites. In the south central part the quarries at Mankato and Kasota have produced stone for many years and in the southwest the same quartzite that is quarried at Sioux Falls is quarried and crushed at New Alm, Jasper and Laverne.

Gravel is abundant in many parts of the state, the largest production being near St. Paul and Minneapolis. In the south central part and in some other sections there are pits which are worked for road gravel which will not do for road aggregate because of too much shale.

Minnesota is building roads from the receipts of a gasoline tax, automobile licenses and some other resources. This state can well afford to build good roads for it is fast becoming one of the important "tourist" states. Officially it is figured that $90,000,000 was spent by tourists in Minnesota last year, but a writer in the current *Saturday Evening Post* says that the figures for this year will be $150,000,000.

Only about 75 miles of concrete road were built last year and the same this year, although contracts for another 75 miles have been let.

I was fortunate in meeting Andrew Siefert of the district office of the Bureau of Public Roads in St. Paul and he met me in Bismark, N. D., on the following day with arrangements all made to see all that could be seen of the rock products industry in North Dakota in a few hours between trains. Of regular producing plants in North Dakota there is just one, the sand and gravel plant of the Riverside Sand and Gravel Co., six or eight miles from Mandan, which is across the Missouri and six miles away from Bismark. The deposit is of glacial gravel about 30 ft. deep and is worked with Channon and American Hoist and Derrick Co. draglines, the bank material being brought in to the washing plant by a Whitcomb gasoline locomotive. The plant is a straight Link-Belt plant with conical screens and Dull cones and about 500 yd. per day is put through. Oversize is crushed by a Telsmith crusher. Considerable railroad ballast has been made at this plant in past years but now the production goes to state and federal aid projects and to commercial work. The gravel is free from shale, which has prevented gravel from some other and smaller operations from being accepted for road work.

North Dakota is building some concrete roads and there is six miles of excellent highway connecting Mandan and Bismark, which goes over the new Memorial bridge across the Missouri.

An interesting hour was spent in the state laboratory observing the working of the test for shale in sand and gravel which has been worked out by P. M. Hegdal, engineer

New office building of the Minnesota State Highway Commission

Crushing plant of the Wisconsin Granite Co. at Sioux Falls, S. D.

of tests. It consists in melting lead acetate and adding water until a specific gravity of 2.4 is reached. This mixture will float shale but allows sand to sink. The separation was very complete so far as one could judge by examining with a magnifying glass. The test is described in detail in the July issue of *Public Roads*. It ought to be equally good as a test for soft coal and lignite.

There was an atmosphere of enthusiasm and interest around the road department at Bismark but at Helena, the capital of Montana, the department had an atmosphere of gloom. There is not much money to be spent on highways and there is considerable opposition to better highways from some of the merchants in the smaller towns and from some of the big wheat ranchers. I met a man who has the largest store in a fair sized Montana town and who has 800 acres in wheat this year, and he gave me the point of view of the opposition. He said that since a good road was built the ranchers drove 10 miles beyond his town to a larger place where the stocks of goods were bigger and better, and he did not blame them for doing so. As for tourists, an occasional one bought gas or a little butter or canned goods but most of them went on to the larger places, even though an excellent free camping ground had been built for them. I suggested that in other states better roads had been found to increase the value of the land, but he said that the value of the land was fixed for him and his neighbors by what it would produce, and all the good roads in the world would not make it produce an extra bushel of wheat or support an extra cow.

Of course this is short sighted. Good roads will do for Montana what they have done in other states, and the land on which only wheat is raised today will, much of it, be ready for diversified farming in a few years and be worth a lot more than wheat land.

At the highway department I was told that all the regular producing sand and gravel plants and rock crushing plants in the state were shut down. What little production there was came from contractors who had portable plants. I got the impression from the visit to the two states that road building in North Dakota is a healthy growing infant but in Montana it seems to be a step-child.

Where the river cuts through the hard quartzite at Dell Rapids, S. D.

Plant of the Wisconsin Granite Co. at Dell Rapids, S. D.

New Market for Waste Stone

LIMESTONE and gypsum producers should welcome, as an outlet for their waste materials, the extension of the practice of dusting coal mines for the purpose of preventing coal-dust explosions, the Bureau of Mines, Department of Commerce, points out. Many limestone producers are handicapped by an accumulation of fine materials which are hard to sell. Gypsum producers likewise may accumulate supplies of gypsum off color or impure, or gypsum mixed with anhydrite which can not be marketed through the regular channels. For dusting material no careful selection according to rigid specifications is required, except that all the dust should pass through a 20-mesh, and that 50% should pass through a 200-mesh screen, and, therefore, waste materials could be sold at low cost. Thus the general application of rock dusting would not only tend to abate greatly the menace of dust explosions but would create a market for waste materials of the limestone and gypsum industries. As low cost is an essential requirement of rock dusting, this market might not be particularly profitable, but it would at least provide an outlet and a small return for material that must often bear the cost of handling with no return.

Wide use of coal-mine dusting will depend chiefly on the availability of low-priced dusting materials. Therefore, the maintenance of low prices and the refusal of limestone operators to increase prices unreasonably as the demand grows stronger will foster the market for their waste products and will encourage a humanitarian work.

As general use of limestone or gypsum in dusting coal mines depends largely on the cost, and the cost in turn depends chiefly on transportation, a survey has been made by the Bureau of Mines of sources of these materials close to coal mines, or on railway lines that would provide, at low freight rates, ready access to coal fields.

Gypsum industries and some branches of the limestone industries use much coal, and cheap transportation might be assured by shipping dusting material back to the mines in empty coal cars.

Wants Granite, Trap or Quartzite

THE Hooper Electrochemical Co., Niagara Falls, N. Y., has asked us to help put them in touch with producers of crushed granite, quartzite or trap rock, which they desire to purchase for a special purpose. Producers should address Homer Whitman, purchasing agent of the company at Niagara Falls, N. Y., home office of the company.

With New York State Quarry Men Again!

WE must confess a weakness for attending New York State Crushed Stone Association meetings—they have one every month. If other quarry men were as active in promoting good fellowship and the welfare of their industry, we would not spend much time in our home office.

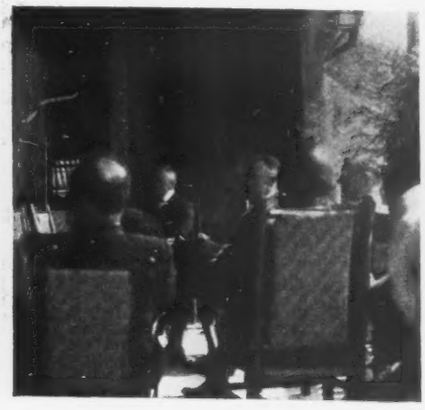
The views herewith illustrate the August meeting of the New York association at Trout Brook Inn, about 12 miles north of Utica, N. Y., and the quarry and sand plants subsequently visited.

About a score of members met at the Utica railway station on August 28 and motored to the inn, where a noon day lunch was served. After a short business session at which specific funds were pledged to support the new activities of the National Crushed Stone Association, the meeting adjourned to the quarry and crushing plant of the L. & M. Stone Co., at Prospect, in which Harry Lancaster and William McGrew are partners.

This is an old but interesting operation, producing about 150,000 tons of crushed stone a year. The quarry is a long, relatively, narrow opening. A Marion and Thew steam shovels are used in the quarry. Blast holing is done with a Loomis well drill. Two 10-ton steam locomotives and two Brookfield gasoline locomotives are used for hauling. Two-yard, end-dump Koppel cars, five to a train, bring the stone to the crusher.

The initial crusher is a No. 9 Allis-Chalmers gyratory; secondary crushers are a No. 6 and a No. 4 Allis-Chalmers.

The August meeting of the New York State Crushed Stone Association



Some crushed-stone celebrities—can you recognize them from behind?

Quarry of the L. & M. Stone Co., Prospect, N. Y.

The quarry and crushing plant of the L. & M. Stone Co., Prospect, N. Y.

Boonville Sand Company New Plant

From Prospect the inspection party continued to Forestport, where the new sand plant of the Boonville Sand Co. was visited. Harold V. Owens and J. H. Wagoner, general manager and superintendent, respectively, acted as hosts. Mr. Owens is a mem-

ber of the New York State Crushed Stone Association through his Peerless Quarries, Inc., operation at Oriskany Falls, N. Y.

The Forestport sand plant is a 1½-yd. Sauerman excavator operation, using a 125-h.p. Meade-Morrison hoist, powered by a Lincoln Electric Co. motor. The 48-in. by 18-ft. cylindrical screen is driven by a 25-h.p. Westinghouse motor through a 30 to 1 Jones reduction gear. The screen has slotted ⅜-in. perforations in the first section and 2¾-in. perforations in the second section.

The sand passing the ⅜-in. slots is recovered and dewatered in two Smith Engineering Co. automatic settling tanks. The material ⅜-in. to 2¾-in. is saved and sold as gravel. Over 2¾-in. is now wasted.

Wash water is supplied by a 4-in. Morris pump, driven by a 50-h.p. Westinghouse motor. The pump has a 6-in. discharge.

What little stripping is necessary is done with a Fordson tractor and a wheeled scraper. Another Fordson tractor is used for spotting cars under the bins—by means of a tow line.

With this extremely simple plant and an operating force of not over five men, 50 cars a day are produced. Mr. Owens thinks it is *the* prize sand and gravel operation, for economy, efficiency and compactness.

Top of quarry incline of the L. & M. Stone Co. plant showing ride rail for automatically lifting tail board of quarry cars

Forestport plant of the Boonville Sand Co.

Another view showing group of visiting quarry men

The pit of the Forestport operation from the top of the screening plant

Canada Mica Production in 1924

CANADIAN mica production increased 16% in quantity and 9% in value in 1924, according to final revised statistics issued by the Dominion Bureau of Statistics.

Shipments in 1924 totalled 4,091 tons worth $357,272 as against 3,525 tons at $326,974 in the previous year. In 1924 the province of Quebec produced 1,677 tons valued at $185,020, while Ontario accounted for 2,414 tons with a valuation of $172,252.

The mica produced in Canada is phlogopite, also termed amber mica, and it is very much in demand for use in the manufacture of electrical appliances. Canadian scrap mica is largely used in the manufacture of prepared roofings, although the rubber and lubrication industries use appreciable quantities.

Exports of mica were: Thumb-trimmed, 88 tons, valued at $52,527; splittings, 285 tons at $424,503, and scrap, 4,519 tons, at $63,610.

Prize Milch Cows as "Rock Products"

Illustrating the Growing Use of Just Ordinary Limestone

By Cary A. Rowland
Flushing, Long Island, N. Y.

MILLIONS of packages of raisins have been sold through the slogan, "Have you had your iron today?" Perhaps the day may come when the catch-phrase, "Has bossy had her lime today?" will be equally effective in selling large quantities of calcium carbonate powder.

It has long been known that lime salts are an essential element in milk. It is the lime in milk which builds bone. Cases of rickets in children have been often entirely cured through liberal feeding with whole milk.

The farm or family cow of a generation ago could easily extract from her feed all the lime she needed for the modest amount of milk she gave. In those days a 5,000-lb. cow was considered a good producer. In fact, the milk was seldom weighed to find out just what she was producing.

Progress in the art of breeding has tremendously increased the capacity of the modern cow to manufacture milk from feed and water. Several cows now have records of more than 30,000 lb. of milk in 365 days. Whole herds averaging from 8,000 to 10,000 lb. are not uncommon.

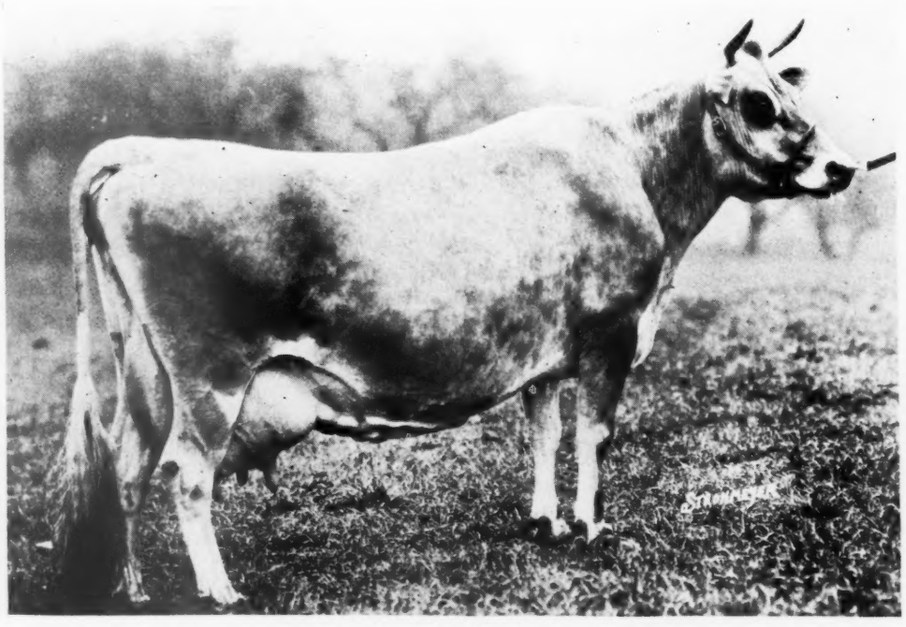
Meantime, the science of feeding has been developed to keep pace with the progress in breeding. Experts have been busy developing rations to keep pace with the cow's increased capacity to turn feed and water into milk.

One set of standard rations has been developed by a group of professors representing the various agricultural colleges of the Eastern States. This group, which is known as the Eastern Conference Board, meets annually to discuss changes in these rations.

The three rations which are now in force vary considerably in some respects, but each carries its quota of calcium carbonate—20 lb. to the ton.

A certain mill in the Middle West makes up immense quantities of feed according to these formulas. These are sold under contract to the various co-operative exchanges.

The influence of these open formula rations reaches far beyond the confines of the exchanges. The same formulas are used as models by tens of thousands of farmers who mix their own feeds, and are closely watched by all feed manufacturers.



Madeline of Hillside 389336 produced 20,624 lb. of milk and 1045.05 lb. of butterfat in 365 days under official test at the farm of her owner, J. T. Carpenter, Shelburne Falls, Mass. This record makes her the World's Champion of her breed. Madeline was fed a grain ration consisting of 10 lb. Eastern States Fulpail ("Open Formula") Feed plus 11 lb. ground oats, making a total of 21 lb. of concentrates daily. This "open formula" feed carried 20 lb. of dairy calcium carbonate to the ton During the year of her record test she consumed a total of 36.5 lb. of pulverized limestone

The inclusion of calcium carbonate in the rations sponsored by the Eastern Feed Conference Board has had a tremendous influence in opening the market for this product.

It was on such an "open formula" feed, supplemented by ground oats, that Madeline of Millside made a new world's record for the Jersey breed. Below is the formula used:

100 lb. corn distillers' grain.
240 lb. gluten feed.
100 lb. gluten meal.
140 lb. choice cottonseed meal.
280 lb. linseed oil meal—O. P.
300 lb. standard wheat bran.
340 lb. hominy (or cornmeal).
200 lb. ground oats.
140 lb. standard wheat middlings.
100 lb. cane molasses.
20 lb. steamed bone meal.
20 *lb. ground limestone.*
20 lb. salt.

Madeline was fed a grain ration consisting of 10 lb. Eastern States Fulpail Feed (formulas shown above) plus 11 lb. ground oats, making a total of 21 lb. of concentrates daily. During the year of her record test she consumed 36.5 lb. of pulverized limestone.

A dairy specialist calculates that the 20,624 lb. of milk produced by Madeline during the year contained total minerals amounting to 180.45 lb., of which 46.04 lb. was calcium oxide. It is obvious that the ground limestone furnished only a portion of the necessary calcium oxide. This shows clearly that the function of the ground limestone is to supplement the natural lime found in the ration, which is high in minerals.

Dairy Limestone Requirements

The first requirement for a calcium carbonate dairy feed is a high percentage of calcium carbonate—at least 90%. Magnesium cannot be substituted for calcium in the dairy ration. For this reason a dolomite limestone is unsuitable.

The second requirement is fineness. One manufacturer guarantees 100% to pass through a 200-mesh screen. A good dairy carbonate must be an *impalpable powder*, readily soluble.

The third requirement is whiteness. A limestone may test high yet show a greyish cast. This probably would not be important in a mixed feed, but where the carbonate is sold clear it detracts from the appearance. As a matter of fact, most people judge purity by color, and a greyish cast suggests impurity no matter what the analysis may show.

How to Find a Market

At least one manufacturer, the Grangers Manufacturing Co., Hartford, Conn., has advertised calcium carbonate direct to dairymen, using generous space in the farm papers of its section. A sample container and a booklet expounding the value of mineral feeds is sent to each inquirer.

Others sell chiefly to feed manufacturers. This is, of course, the easiest and least expensive way.

Which method should be used depends much upon local conditions. Sometimes both methods can be combined.

There are about 25,000,000 cows in the United States. It would be an easy matter to pile up statistics showing an enormous potential market. As a matter of fact such statistics would not mean very much, because in many sections calcium carbonate is not used at all.

A glimpse of the actual market can be gained from the figures for a single section where dairying is a major industry. There are 124,000 dairy farms in New England consuming 1,022,000 tons of grain and feed annually. "Open formula" feeds carrying 1% ground limestone are widely used throughout this region and it is reasonable to suppose that farmers who mix their own would wish to incorporate this necessary ingredient.

Before entering upon the manufacture of calcium carbonate as a dairy ration ingredient it would be well to consult the dairy specialist of the extension department of your state agricultural college. He can tell you what the experts are recommending. Then a consultation with feed dealers will tell you what farmers are actually buying. Frequently there is a wide divergence between theory and practice.

Gypsum Chicken Grit

Compounded Grit Based on Extensive Experimental Research

By Professor George A. Olson
Gypsum Industries, Inc., Chicago, Ill.

IT is now generally recognized that chickens require grit which will aid in carrying out the processes of digestion to completion. To meet these requirements it becomes necessary to provide minerals which will serve (1) as an abrasive; (2) as an aid to digestion; (3) as source of minerals to supplement those contained in feeding stuffs; (4) as an alimentary canal corrective and (5) as a laxative.

The substances used to make up the grit should be a mixture of fairly hard particles with softer minerals. A large part of the grit should break down in the process of crushing food and enter into mechanical combination. Furthermore the grit should be sufficiently soluble in the digestive tract so that adequate supplies of minerals for bodily needs will be provided. In no case should the abrasive to be too hard or too sharp.

Result of Experiments

The specifications mentioned have been derived through a study of poultry needs and as a result of experimental work. They represent a combination which provides chickens with those ingredients essential for the crushing of grains and becoming a part of the food mixture. As a result the maximum surface of food comes in direct contact with the digestive juices in minimum time. It is in fact a necessary operation where forced feeding methods are designed to promote quick growth and maximum production of eggs. This combination also supplies the minerals required for bone and tissue building in forms which are readily available for assimilation and at the same time corrects any objectionable acidity or alkalinity which might arise as a result of the digestion of food. In addition to these requirements the grit must possess mild laxative qualities which are manifestly necessary in the care of poultry under present day methods of feeding.

The grit must be compounded from selected materials so that desired crushing stress, suitable mechanical inclusion and mineral solubility can be assured. It must be crushed and screened to finenesses which will work in the digestive canal to the best advantage. In this way the chicks are provided for, as well as the chickens.

Much Science Needed in Proper Compounding

As much science is required to prepare a mineral grit which will satisfy poultry needs as there is technique involved in preparing well balanced rations for growth, fattening and for production of eggs. There is just as much need for these provisions as there is exigency for proteins, carbohydrates, etc. Since they work together and supplement each other they are recommended as important factors in developing healthy stock. Sunshine, fresh air and clean, fresh water are other assets.

Provision must be made to take care of the gases formed and the waste products since digestion of food is of no consequence if depressive conditions prevail. The fowl must be kept active, otherwise the appetite will subside and the food will not be relished. Such provisions are the solution of many difficulties experienced in the past. They aid in making poultry raising a success.

By following these specifications the gypsum manufacturers are supplying those minerals which have the properties necessary in carrying the process of digestion to completion.

Gypsum-Treated Northwest Farms Yield Increased Crops

THE use of gypsum in Northern Idaho to fertilize alfalfa plots has produced increased yields with a higher protein content, Prof. G. R. McDole of University of Idaho states, "The use of gypsum has been one of the most valuable recommendations yet developed by the Soils Department of the College of Agriculture and through its use the farmers have benefited materially."

A gypsum treated test plot yielded 6160 lb. per acre in comparison with an untreated check plot yield of 2760 lb. It is claimed that one application of gypsum lasts 5 years.

Four year tests made on cutover lands in Western Montana and at Sandpoint, Mont., by the extension office of Flathead County have shown the increased yield to be over 100%. In nearly all cases the gypsum is applied at the rate of 200 lb. to the acre.—*The Idaho Farmer.*

Mineral Mixtures Are Good for Porkers

EXPERIMENTS carried on at the Idaho Agricultural Experiment Station on mineral mixtures in hog feed, brought out the fact that good results were obtained on various mixtures.

Some of these simple mixtures are good for swine: Equal parts by weight of ground limestone and salt; equal parts of wood ashes and salt. These supply calcium, but no appreciable amounts of phosphorus. Equal parts of ground limestone, salt and either bone meal or ground rock phosphate. This furnishes both calcium and phosphorus. Nine parts of either bone meal or ground rock phosphate and one part tankage for flavoring. These mixtures also furnish both calcium and phosphorus.

The most necessary elements which are furnished by all mineral mixtures are calcium, phosphates and chlorine. All of the above simple mixtures supply these elements.

Best results with mineral mixtures are in cases where hogs are fed an unbalanced ration, especially in the dry lot.

Use of the Personal Poster for Safety Work*

Keeping Safety Work from "Getting Stale"

By C. P. Hoffman
Pacific Portland Cement Co., Cons., Cement, Calif.

"MONTHLY safety meeting tomorrow, Mr. H."—The plant superintendent is speaking to his mill foreman.

"Who has charge of the meeting this month, Chief?"

"Why, it's Mr. B.'s turn—have you heard of many of the men with suggestions this month?"

"I believe Wright in the machine shop and Elliott, the stockhouse foreman, have something, but, don't you know, Chief, this plant is so well guarded now, you can hardly blame the men coming to meeting with the same old story—nothing to report."

The Chief nodded agreement.

"We have hashed this subject over before, and you and I, in fact I believe the entire safety committee, feels it's getting stale with the men. Here's our plant, safe, fool-proof you might say; but still we keep after the men for not making suggestions for more guards. It's not in the cards. How many safety engineers have gone through our plant during the past year or so, with the same report? Do they ever suggest anything? No! And those engineers are sure after anything to help the looks of their reports—they have to—or their people would soon think they were not on the job. I tell you Chief, the plant's safe."

The Chief looked expectant.

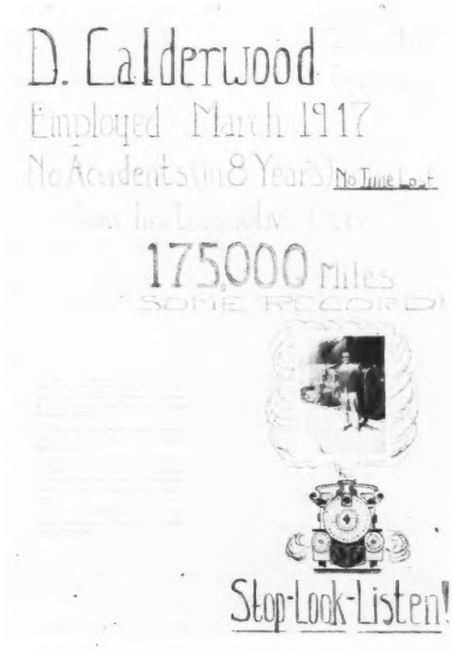
"Of course, we may continue to have accidents. You know a lot of men can't keep out of their own way and we are bound to have our share of them here. Believe me though, just as quick as I get a line on one, down the line he goes. If I can't teach a man how to think for himself—what's the use? Better let him go than to feel afterwards I helped him along to a serious accident.

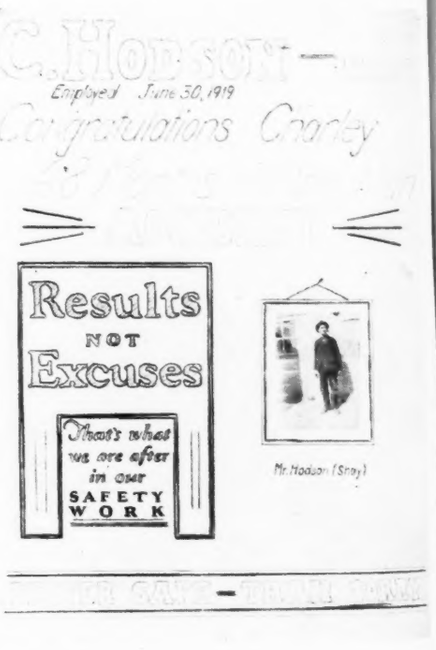
"I feel the responsibility of this safety work, and sometimes say to myself—'Home, you can't do it all yourself; they must help, too'—but how can we keep up the interest?"

"All right, H., don't forget the meeting," and the superintendent continued his rounds about the plant.

"Well, Mr. R., how's things stacking up this morning? By the way—safety meeting tomorrow — notify your men, please." Then the superintendent, by way of questioning, quietly looks at the master mechanic—awaiting the usual conversation. "Say, Chief," the M. M. starts out, "if we could only interest the men on the subject of safety to the same extent people get interested in baseball, prize fighting or flappers, wouldn't it be great? Nothing to it then for you and me but sit pretty. They say our records are good, but can't accidents be stopped altogether? You go to a ball game—two men out in the ninth inning—game tied. Captain speaks to the batter—'For heaven's sake, Hickey—HIT THAT BALL—SMACK IT SO THEY'LL NEVER FIND IT.' A personal appeal, and what often happens—Hickey comes through and the game's won. I believe this safety work more a matter of personal appeal than safeguards. If we could only organize our men as one big ball team un-

IN view of the meeting of the National Safety Council at Cleveland, September 28 to October 2, this article is of particular interest. At the Cleveland meeting of the National Council will be the first joint session of the newly organized quarry section with the portland cement section.—The Editor.





*Reprinted from the May-June *Accident Prevention Bulletin* of the Portland Cement Association.

der a good fighting captain, they'd sure cop all pennants for safety."

The superintendent smiles at R.'s enthusiasm and walks on—but he's thinking—one big ball team, one big ball team. What enthusiasm and results would not be possible?

The next day Mr. B. conducts the safety meeting.

The accident statistics were reviewed and among other interesting things he reported:

An average working force of about 375 men.

Thirty-seven men had been employed continuously for from five to 22 years without a time-lost accident since the beginning of the safety records, and in this number office employes or men not ordinarily subjected to injury were not included.

"By the way," says Mr. B., "that party's suggestion on the making of home-made posters to be placed on the bulletin board appeals to me. Thirty-seven men have worked here a total of 354 years, or an average of 9½ years without accident, and as all of them are still on the payrolls, can we not start making our posters, using these 37 men as subjects? I wonder if we have any talent here to make the posters."

Time, about noon. Place, one of the five plants of the Pacific Portland Cement Co., Consolidated, located at Cement, Solano county, California. An employe from the office is about to bulletin a home-made poster covering the record of a workman who has done well in his efforts toward safety. Several employes in passing collect about the bulletin board to get a glimpse of the poster.

Patrick Mallin, a machinist, speaking louder than his usual tone of voice, remarks, "Who have they got this time? That poster the other day—the one they put up of Dave Calderwood, showing a sketch of his locomotive and everything—that was a dandy. Did you fellows notice that they claim Dave had been on the job every day since March, 1917? No accidents in over eight years. Claimed he had driven his locomotive over 175,000 miles."

Pat takes another breath and then, "good picture of Dave, too. Say! That 175,000 miles is probably right, too—you know they keep records of everything nowadays. Guess it's right, but 175,000 miles is going some, and eight years without an accident on that job is blamed good work."

In the meantime the office man is unrolling the poster and placing it in the bulletin case. While the men are still listening to Pat they are becoming more curious to get the first glance at the new poster.

Charley Hodson, another employe in the machine shop, bursts out, "That's me, fellows. Wait a minute—let's see. Yes! —they got the pipe in my mouth all right, but who in H—— told them to use that nick-name? Bet Gallagher had something to do with that, and I'm going to see the fellow that makes Gallagher's poster and get him to call Gallagher 'Jerry.' That'll hold Gallagher for awhile."

Then Mr. Hodson continues to read his poster and finds the following:

Charles Hodson — Helper — Employed June 30, 1919. Congratulations, Charley —68 months without an accident.

Then, after his picture is framed off, the safety message:

Results, Not Excuses — That's What We Are After in Our Safety Work.

And at the bottom of the poster the coined phrase is used:

"Better Safe Than Sorry."

The bulletin is brief and attractive, well arranged and, in all, is a creditable piece of work considering that it is home-made.

The men josh Charley—call him by his nick-name, "Shay," and sort of seem affectionate. Then Dave Bailey speaks up, "Say, Charley—you needn't swell up—wait till they get my poster up. Been here steady since 1906, 19 years, but let's see—by George, that's right—come to think, I did have an accident long time ago. Darn near broke my fool neck up in the kiln room one day. I believe that was before they started keeping safety records up at the office. Maybe they'll have me up on one of these posters anyway."

With this Dave looks around rather sheepishly, thinking maybe he'd said too much. Maybe he hadn't done so well after all. However, in a few days Mr. Bailey's poster was bulletined and the following is what his fellow employes read:

D. Bailey—Kiln Room Foreman—Dave came to work here July, 1906, and hasn't been hurt since accident records began. Wonder how many employed mechanically can measure up to this record?

In the center of the poster, to one side is Mr. Bailey's picture and on the opposite side is a typewritten list of suggestions offered by him during a period fo years.

Underneath his picture are the remarks:

"Didn't have space enough for all of Mr. Bailey's suggestions, but—anyway—we'll crowd them in BEST we can. Two of these Safety Suggestions brought home the bacon."

"Brought home the bacon" meaning a monthly cash prize offered by the company for the best safety suggestion during the month; then, at the bottom of the poster, the coined phrase:

"Good Enough Is Not Good Enough—Unless Safe."

What good are these posters accomplishing? What relation have they to safety and how are they keeping down our accidents? While it is impossible to measure the results being obtained through them, we do know they are accomplishing some good. While numbers of them have been posted, the interest has not seemed to lag. They present a topic for conversation and keep the doctrine of safety before the whole plant.

At Cement, our company has been a pioneer in safety work. Through the efforts of a real safety organization, quite satisfactory results have been produced. However, the constant functioning of any organization on a single topic, where there are only certain means, such as committee meetings, possibly conducted by the same few men, year after year—that topic is bound to become dry. The subject must not become dormant. How to keep it alive and hold the interest of the men is the problem.

Keep Out of Ruts

Various plants have adopted different ideas. We at Cement are optimistic and we accept the responsibility of our accidents. We feel that in order to satisfy our management we must produce safely. As soon as we feel ourselves approaching a rut, someone must get busy, for above all things this subject cannot be allowed to drift. First some single idea will present itself and by the time it is worn out another will occur to you, or to some one in your organization. Our posters have stimulated interest for several months, and you may find it surprising, as we did, the number of men who have a talent for this work.

After completing about 35 posters, the idea was suggested, and carried out, to offer a prize for the best poster submitted within a stipulated period. The results were so gratifying, and we received such excellent work, that our management rewarded each employe who entered the contest. There were six contestants and they submitted 12 posters.

While this subject is still interesting, and accomplishing some good, a time will come when we will have to introduce something new. Having this in mind, we are beginning to organize first aid teams. The first two or three teams will be trained and accredited by our hospital department. These teams, in turn, will organize and teach other teams, and this work should continue until every employe is accredited in first aid work. After this, competition between the various teams should help prolong the interest. While we feel our organization is sold on safety, experience has taught us that continued success or improvement rests on how well we can continue to keep our men interested.

Some Possible Commercial Uses of Gypsum Other Than Plaster

Effect of Gases of Various Kinds at High Temperatures on Gypsum

By P. O. Scribe*

THERE have been quite a few processes which have been carried out on a commercial scale and which have depended on the action of gases on gypsum at high temperatures. The one which is perhaps best known is the process developed by the Badische Anilin und Soda Fabrik for the manufacture of sulphur from gypsum as well as sulphuric acid and cement as a by-product. For example the raw gypsum may be mixed with sand, clay and coal and then burnt in rotary kilns. While it may be a fact that at the present time no technical use is made of the other reactions that are produced by the action of gases on gypsum, it remains a fact that such reactions may possibly be put to important commercial application at some time in the future.

It is for this reason that an investigation was made of the action of various gases on gypsum which was reported in *Chemiker Zeitung*, 1925, page 430, ff, and in the preparation of this article the author wishes to acknowledge his indebtedness to the information that is given in this article.

The aforementioned investigation was carried out on a pure gypsum which was calcined at a temperature of 450 deg. C. The apparatus which was employed in the experiments consisted of an electric furnace. Containers in which the gypsum was put were placed in porcelain or quartz tubes and inserted into the furnace. The heating was continued for a period of one hour and the temperature was recorded with the aid of a Le Chatelier thermo-couple.

After the heating the loss in weight in the gypsum mass was determined and the decomposition product was then analyzed. The resulting sulphide of calcium was decomposed with the aid of sulphuric acid and the sulphuretted hydrogen evolved was absorbed in a tenth normal solution of iodine, and then the excess iodine was titrated with the aid of a standard solution of sodium thiosulphate. On the other hand the titration, carried out, with the aid of hydrochloric acid, gave the sum of sulphide of calcium and calcium oxide, and in this manner it was possible to determine the proportion of the lime. Other analyses were made to determine the amounts of sulphur dioxide, sulphur trioxide and carbon dioxide evolved.

*Nom-de-plume of a prominent consulting chemical engineer.

Editors' Note

ALTHOUGH of a highly technical nature we believe this contribution will prove of great value to every one interested in the possibilities of gypsum. The data given is so far as the editors are aware the only data in the English language on the fundamental chemical reactions of various gases on gypsum.

Some of these gases are present when gypsum is calcined in an ordinary rotary kiln. Others can be introduced on occasion.

We believe the chief value of this article is the conception it gives of the future of rock products chemistry. Calcium, sulphur and oxygen, which are the constituent elements of gypsum, are among the most active and vital elements in all nature. The same is true of the calcium, carbon and oxygen which compose ordinary limestone.

When more such studies as the one here referred to have been made we shall doubtless come to realize that the "burning" of lime, gypsum and cement is a far more complex chemical process than it is ordinarily conceived to be; and that future manufacturing processes will not stop at present crude products.—The Editors.

In the first place when the sample of gypsum was heated to incandescence in a stream of dry air at a temperature of 1000 deg. C., there was obtained on the average 0.3% of sulphur trioxide.

Effect of Carbon Monoxide

The effect of carbon monoxide (CO) was then investigated. The gypsum was heated in a stream of carbon monoxide gas which was free from carbon dioxide. The reaction commenced at a temperature of 700 deg. C., which was easily detected by passing the gases that were drawn from the furnace through a solution of baryta water ($Ba(OH)_2$ Aq.). At a temperature of approximately 920 deg. C. the reaction was completed in accordance with the equation:

$$CaSO_4 + 4CO = CaS + 4CO_2.$$

At the aforementioned temperature the content of carbon dioxide in the gases was 98%. Above 920 deg. C. the gases contained sulphur dioxide and as the temperature rose the percentage of this gas rose as well. As the temperature increased to 1000 deg. C. the reaction changed and both sulphur dioxide and carbon dioxide were produced, according to the following equation:

$$CaSO_4 + CO = CaO + SO_2 + CO_2.$$

Effect of Hydrogen and Water Vapor

Former investigations have shown that when the gypsum has been heated in a steam of water vapor to a point of incandescence besides oxygen and sulphur dioxide, sulphur trioxide is also evolved. The investigations that were described in *Chemiker Zeitung* indicated that at a temperature of 1000 deg. C. only a very slight reaction took place. About 3.9% of lime were found in the products of decomposition. But when the temperature was raised to 1100 deg. C. and a proportion of coal added to the gypsum, then the production of lime was increased to 23.2%. Water has apparently no effect on the character of the sulphate of calcium decomposition products when coal is absent.

On the other hand hydrogen (H_2) has the effect of changing the sulphate of lime into calcium sulphide, a 70% conversion taking place when the gypsum is heated to 1000 deg. C. in a current of dry hydrogen gas. After a period of heating lasting thirty minutes about half of the gypsum is converted and then the temperature was increased to 1100 deg. C. the heating continued for another thirty minutes. The reaction that takes place in the first case is shown in the first equation, and that in the second case in the second equation as given below:

1. $CaSO_4 + 4H_2 = CaS + 4H_2O$
2. $3CaSO_4 + CaS = CaO + 4SO_2$

When the incandescent gypsum was treated with a current of sulphuretted hydrogen gas (H_2S) at a temperature of 1000 deg. C.,

there were produced 27.8% of lime and 61.8% of calcium sulphide. When the reaction was conducted at a temperature of 1100 deg. C., the quantity of lime was raised to 36.1% and that of calcium sulphide was decreased to 41.2%. The reactions that took place are explained in the following equations:

$CaSO_4 + 2H_2S = CaS + SO_2 + 2H_2O + S$

$CaSO_4 + H_2S = CaO + SO_2 + H_2O + S.$

The same test was carried out with vapors of carbon disulphide (CS_2). In this case again the gypsum was heated to a temperature of 1000 deg. C. Only 46% of calcium sulphide was obtained according to the following equation:

$CaSO_4 + CS_2 = CaS + 2SO_2 + C.$

Sulphur dioxide gas was detected in the evolved gases and carbon was found in the reaction tubes.

Effect of Nitric Oxide

The quantity of lime that is formed when the gypsum is heated in a current of nitric oxide (NO) rose as the temperature increased. Only 7.3% lime was found at a temperature of 1000 deg. C. and this rose to 39.0% at a temperature of 1100 deg. C., while the percentage of calcium sulphide dropped from 75.2% in the first case to 48.3% in the second case. The presense of sulphur dioxide was detected in the evolved gases. The equations of reaction are as follows:

$$CaSO_4 + 4NO = CaS + 4NO_2$$

$$CaSO_4 + NO = CaO + SO_2 + NO_2$$

Final

$$2CaSO_4 + 5NO = CaS + CaO + 5NO_2 + SO_2$$

Effect of Phosgene Gas

The effect of phosgene gas ($COCl_2$) on calcium sulphate at various temperatures, 380, 450, 480, 520, 900, 950 and 1000 deg. C., was also investigated. After the experiments the content of chlorine in the products of decomposition was determined. The action of phosgene gas begins at a temperature of 520 deg. C. and the yield of calcium chloride ($CaCl_2$) is 69%. At 900 deg. C., at which temperature the phosgene gas begins to dissociate into carbon monoxide and chlorine, it drops to 26.9%, while at 950 deg. C. it is 79.2% and at 1000 deg. C. it is 100%. In the presence of 50% of wood charcoal the action of the phosgene gas on the gypsum commences at a temperature of 380 deg. C. and the yield of calcium chloride amounts to 35.5%, at 450 deg. C. it is 47.3% and at 520 deg. C. it is 52%. In the place of wood charcoal animal charcoal was employed and the results were then as follows: at 380 deg. C. a yield of 70% of calcium chloride, and at 450 deg. C. 100%.

Action of Sulphur Chloride

The gypsum was treated with sulphur chloride (S_2Cl_2) at temperatures of 200, 400, 600, 800 and 1000 deg. C. A yield of 100% of calcium chloride was obtained at a temperature of 1000 deg. C. When silica (SiO_2) is employed as a catalyst the reaction is more complete at lower temperatures. In the presence of this catalyzer the yield of calcium chloride was 12.6% at 400 deg. C., 76% at 600 deg. C., 90.1% at 800 deg. C. and 97.3% at 1000 deg. C. Charcoal reduces the completeness of the reaction. The reactions that take place are seen in the following equations:

$2CaSO_4 + 2SiO_2 = 2CaSiO_3 + 2SO_2 + O_2$

$2CaSiO_3 + 2S_2Cl_2 = 2CaCl_2 + 2SiO_2 + SO_2 + 3S.$

Final — $2CaSO_4 + 2S_2Cl_2 + (SiO_2) = 2CaCl_2 + (SiO_2) + SO_2 + 3S + O_2$.

At a temperature of 900 deg. C. chloroform ($CHCl_3$) vapors are able to convert 17% of the calcium sulphate into calcium chloride and 78.9% into calcium oxide. The gases that are evolved from the gypsum contain sulphur dioxide and phosgene, which may have been formed in the colder portion of the tube as it is known that phosgene will be completely dissociated at a temperature of 800 deg. C. into carbon monoxide and chlorine. The products of action of chloroform on gypsum are collected in the usual manner by absorption of condensation in suitable vessels. In the first absorption flask, that is, in the dry flask, there was found to be accumulated a considerbale amount of hexachlorobenzol which has a melting point of 229 deg. C. This substance is a pyrogenetic decomposition product of the chloroform. It is possible that the reaction which takes place between the chloroform and the gypsum may be expressed by the following equation: $2CaSO_4 + 2CHCl_3 = 2COCl_2 + 2SO_2 + CaO + CaCl_2 + H_2O$. The phosgene gas that is formed in accordance with the above equation is then decomposed by the water in accordance with the following equation:

$$COCl_2 + H_2O = 2HCl + CO_2.$$

Action of Chlorine and Carbon Tetrachloride

The action of chlorine (Cl_2) is to convert the calcium sulphate into calcium chloride and at a temperature of 1000 deg. C. there is a conversion of 34.15% of the gypsum. When silica is present during the reaction a much greater amount of chloride of calcium is obtained, namely 68.9%, while in the presence of carbon the yield is 65.9%. Evidently the silica acts as a catalyst in accelerating the reaction and increasing the yield. The reactions that take place are expressed in the following equations:

$CaSO_4 + Cl_2 = CaCl_2 + SO_2 + O_2$

$CaSO_4 + SiO_2 = CaSiO_3 + SO_2 + O$

$CaSiO_3 + Cl_2 = CaCl_2 + SiO_2 + O$

$CaSO_4 + C = CaS + 2CO_2$

$CaS + Cl_2 = CaCl_2 + S.$

When the calcium sulphate was heated to a temperature of 900 deg. C. and a stream of carbon tetrachloride (CCl_4) is passed over it, there is no formation of calcium oxide. Phosgene gas is found in the evolved gases. The percentage of calcium chloride found is 57.1%. Equation:

$CaSO_4 + CCl_4 — CaCl_2 + SO_2 + COCl_2 + O$

Action of Gaseous Ammonia on Gypsum

The action of gaseous ammonia (NH_3) on gypsum was tested out at the temperatures of 800 and 900 deg. C. In the first case the decomposition products were 18.1% of calcium oxide and 58.9% of calcium sulphide.

In the second case there were found 36.6% of calcium oxide and 63.1% of calcium sulphide.

It appears as if the reaction takes place in two ways. The first reaction that ensues in the process can be described by the following equation:

$3CaSO_4 + 8NH_3 = 3CaS + 4N_2 + 12H_2O.$

The second reaction is indicated in the following equation:

$$CaSO_4 = CaO + SO_3 + O.$$

Then the sulphur dioxide (SO_2) which is formed combines with the ammonia to form an aminosulphurous acid according to the equation: $SO_2 + NH_3 = NH_2SOCH$. This substance when brought into contact with

Gas used	Weight of $CaSO_4$ in grams	Catalyst	Temperature in degrees C.	Weight after test	Yield in per cent $CaCl_2$	CaS	CaO
CO	0.6069	.....	920	0.3246	.....	98	.....
	0.5416	.....	1000	0.3080	.....	58.9	2.9
	0.6832	.....	1100	0.3692	.....	41.1	34.05
H_2O	0.4185	.....	1000	0.3958	.....	.....	3.9
	0.2676	C	1100	0.2010	.....	.....	23.2
H_2	0.1993	.....	1000	0.1229	.....	70.0	.....
H_2S	0.3004	.....	1000	0.1543	.....	61.8	27.8
	0.2839	.....	1100	0.1510	.....	41.2	36.1
NO	0.1518	.....	1000	0.0722	.....	75.2	7.5
	0.1261	.....	1100	0.0635	.....	48.3	39.0
	0.3060	.....	520	0.2670	69.0	.....	.....
	0.2164	.....	900	0.2040	26.9	.....	.....
	0.2684	.....	950	0.2276	79.2	.....	.....
	0.2781	.....	1000	0.1940	100.0	.....	.....
$COCl_2$	0.1970	.....	380	.....	35.5	.....	.....
	0.2263	.....	450	.....	47.3	.....	.....
	0.2284	.....	520	.....	52.0	.....	.....
	0.2250	.....	380	.....	70.0	.....	.....
	0.2120	.....	450	.....	100.0	.....	.....
$CO + Cl_2$	0.3076	.....	480	0.3059	.....	.....	.....
	0.2350	SiO_2	400	.....	12.6	.....	.....
	0.3122	SiO_2	600	.....	76.0	.....	.....
S_2Cl_2	0.3562	SiO_2	800	.....	90.1	.....	.....
	0.3090	SiO_2	1000	.....	97.3	.....	.....
	0.2998	.....	1000	.....	60.3	.....	.....
$CHCl_3$	0.5124	.....	900	0.2367	17.02	.....	78.9
CCl_4	0.1106	.....	900	.....	57.1	.....	.....
NH_3	0.2119	.....	800	0.1120	.....	58.9	18.1
	0.1751	.....	900	0.0841	.....	63.1	36.6
	0.1556	.....	1000	1.1444	34.15	.....	.....
Cl_2	0.1153	SiO_2	1000	0.0932	68.9	.....	.....
	0.1262	C	1000	0.1437	65.9	.....	.....
Petroleum	0.2313	.....	900	.....	11.0	.....	.....
CO_2	0.5230	.....	1000	0.5230	.....	.....	.....
SO_2	0.4371	.....	1000	0.4371	.....	.....	.....

water gives ammonium sulphate ($(NH_4)_2SO_4$) and $(NH_4)_2S_3O_6$.

Other experiments were made with the gypsum and in one case petroleum vapors were passed over the gypsum heated to a temperature of 900 deg. C. The result was a decomposition of the calcium sulphate into calcium sulphide.

At a temperature of 1000 deg. C. in the presence of carbon both sulphur dioxide and carbon dioxide have no effect on the gypsum. It appears that the carbon reduces the sulphate to the sulphide, but then the sulphur dioxide and carbon dioxide converts it back into the sulphate.

The results obtained in these experiments are summarized in the tabulation given in detail on the preceding page.

Cost of Sheathing with Gypsum Board

[The following statement of comparative costs of gypsum and wooden lumber sheathing has been furnished ROCK PRODUCTS by the United States Gypsum Co.]

EXACT data as to the cost of sheathing a frame house with Gyp-Lap fireproof sheathing lumber are made available by contractors who have used the new board, through its manufacturers, the United States Gypsum Company. It was first put on the market last fall.

This gypsum sheathing was specified by Ralph E. Stoetzel, architect, of Chicago, as a backing for brick veneer on a $50,000 residence at Glencoe, Ill., recently completed by the Cadenhead Company, general contractors. This concern found the cost was as follows:

3000 sq. ft. Gyp-Lap at $45.00 per M	$135.00
96 hrs. carpenter-labor at $1.25 per hr.	120.00
100 lbs. 6 d. common nails	3.85
Total	$258.85

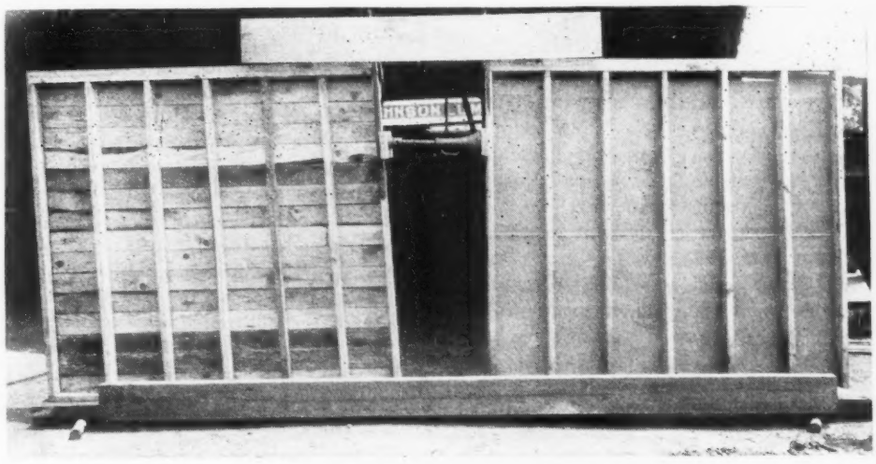
The total waste of gypsum board was exactly 1%. The labor-item includes the cost of erecting a double-deck scaffold. On this job installation-cost was higher than on most residences because the design required that all but 11 boards be cut to fit. As compared with these figures, the Cadenhead Company submitted the following estimate of what it would have cost to do the same job with wood sheathing, on the basis of their customary experience:

3600 sq. ft. 1x6 Y. P. sheathing, $42.00 per M	$151.20
144 hrs. carpenter-labor at $1.25 per hr.	180.00
120 lbs. 8 d common nails	4.50
6 rolls black building paper at $3.75 per roll	22.50
Labor for applying the paper at $1.25 per roll	7.50
Nails for the paper at $.10 per roll	.60
Total	$366.30

The waste of wood sheathing was figured at 600 sq. ft. So the contractors figured that the total saving in sheathing this house with the large-unit gypsum board was $107.45, or about 30%. There also was a considerable saving of time which permitted of more rapid progress of the brick-laying and the rest of the operation.

Another residence with brick veneer exterior was sheathed with this gypsum fireproof sheathing at Indianapolis by the Mertz Construction Company. According to these contractors, two carpenters put on 2000 sq. ft. of Gyp-Lap within nine hours, or at the rate of 111 sq. ft. per man per hour. It was estimated that the labor cost ran about 1c. per sq. ft.

This is not the customary method of employing this material as a stucco-backing, it being necessary only to staple a reinforcing fabric over the gypsum board and then apply stucco over that. This case is interesting, however, because two carpenters ap-



Lumber panel left—gypsum sheathing on the right

A house sheathed with gypsum wall board

At Rockford, Ill., H. Waddell was contractor on a house with a concrete block foundation, where furring strips were placed over the gypsum sheathing to support lath which was covered with stucco. plied the 1300 sq. ft. of sheathing in 11 hr., or at the rate of 118 sq. ft. per hour. The contractor stated that he saved 40% of the sheathing-cost by use of this material.

Rockford's building commissioner approved the material after observing the construction of this job. At Indianapolis, application of the sheathing was held up by Francis F. Hamilton, commissioner of buildings, until tests were conducted. The fireproof and insulating qualities of the board were not called into operation, but Mr. Hamilton required proof of rigidity. ity.

Accordingly, two test-panels, both 8 ft. long by 7 ft. high, were built of 2x4 studs spaced 16 in. on centers. On one panel-frame the studs were covered with 1x6 No. 2 Y. P. sheathing; on the other, with Gyp-Lap. The two panels then were attached to the same heavy sill with their ends 2 ft. apart. A building jack was inserted between the ends of the panels and was turned so as to force them apart. When the screw of the jack was fully extended, it was found that the deflection of the wood-sheathed panel was six times as great as the deflection of the one sheathed with gypsum. Following the test, the commissioner of buildings issued an approval of the material, stating that "the test was very satisfactory and we believe the material will be a benefit to builders."

When Gyp-Lap first was offered to the building industry it was closely similar to Sheetrock wallboard. Its manufacture has been changed so that now the board is ½-in. thick instead of ⅜-in. as at first, and it has a different extra-heavy waterproof covering instead of the ordinary paper.

Theory and Practice of Lime Manufacture*

Part VI—Kiln Capacity, Rating, Proper Kiln Proportion and Some Operating Data on Test Kilns

By Victor J. Azbe
Consulting Engineer, St. Louis, Mo.

THIS installment of the series of articles begun in the June 27 issue of Rock Products covers the very core of the problem of the lime-kiln designer and operator. How can we compare the efficiencies of lime-kiln manufacturing operations where there exists no standards for comparing one kiln performance with another? Since the delivery of this paper before the annual convention of the National Lime Association in May, President Charles Warner has appointed a standards committee to consider this problem in detail.

Kiln Capacity, Rating, Proper Kiln Proportion and Operation

A boiler output is rated on the basis of evaporation per square foot of heating surface and boiler size in terms of number of square feet of heating surface. No such definite figure is used in connection with lime kilns, and so one does not know if 15 tons of lime from a kiln per day is good or poor output. Evidently it must be good when kiln is very small and poor if very large.

Some definite basis for rating kiln size should be of quite considerable value and the writer for a time used the "pounds of lime per square foot of shaft area" expression; but this is not very satisfactory since kilns greatly vary in height.

Evidently heating surface in lime kilns (the lime and stone surface where the heat is absorbed) is the proper basis of rating lime kilns as well as boilers; but what is the heating surface of the lime kiln; who knows? In any case though the heating surface is closely proportional to the cubical content of lime kiln. Therefore, why should lime kiln capacity not be based on the content figure and the output judged by the expression of "cubic feet of lime kiln space per ton of lime output" or "tons of lime per day per 1,000 cubic feet of kiln space."

A kiln that will have an output of a ton of lime for 121 cu. ft. of kiln content is operating at a higher capacity than the kiln producing the same amount of lime for 161 cu. ft. of effective kiln content, in spite of the fact that the first is producing only 10½ and the second 18½ tons of lime per day. This actually occurs in kilns that are designated in the enclosed Table II as P-18 and MG. P-18, being a larger kiln, having more surface to absorb heat should rightly make more lime but, due to less efficient use of this surface, the amount of lime made for equal cubical content is much less. In other words, the kiln putting out the most lime is performing poorly, and its output on the basis of performance of the smaller kiln should be 24.6 tons of lime or 33% more.

In the same tabulation, Kiln G performs even better than Mg, the output being one ton of lime for 107 cu. ft. of effective kiln content. On this basis, Kiln P-18 should have an output of 27.8 tons and Kiln MG 11.7 tons. (Effective kiln content is called the cubical content of kiln minus the cooler.)

Kiln M performs the worst. The output is only 10 tons while on G basis, it should be 21 tons. This performance is quite common since M kiln is a typical one and the output from this type of kiln in all plants is about the same, around 10 tons.

Evidently there are other factors that control kiln output, but the same is true of boiler output, still boiler rating on the surface basis is quite practical and useful. It may be that not enough heat is furnished, or not enough air to burn the gas properly, or there may be too much air and not enough gas. There may be many things that would throw the kiln performance downwards, and fortunately most of them are controllable, and if the same conditions are obtained on two different kilns, very closely the same output will be obtained.

TABLE II—DIMENSIONS AND PERFORMANCE FACTORS OF VARIOUS KILNS

Kiln	P-18	G	M	MG
TONS OF LIME PER DAY	18.5	22.5	10	10.5
Kiln cross-section at eyes	5x9½	5x7'4"	5x7½	4'x6'10"
Area of shaft at eyes, square feet	47.6	36.7	37.5	29.5
Eye gas entrance area to kiln, square feet	25.9	20.8		12.9
Per cent entrance area of shaft area	54.4%	57%		44%
Total height above bottom of draw hopper	51'9"	50'8"	43'	39'
Height above cooler—working kiln height	42'6"	40'	34'6"	30'6"
Shaft height between cooler and storage	26'3"	21'	21'3"	20'7"
Cooler depth	9'	10'8"	9'	8'6"
Cooler space, cubic feet	291	340	240	165
Shaft space, cubic feet	1251	900	790	665
Storage space, cubic feet	1723	1500	1460	605
Total kiln space	3265	2740	2490	1435
EFFECTIVE SPACE, CUBIC FEET SHAFT AND STORAGE	2974	2400	2250	1270
Lime equivalent of lime and limestone above eyes, tons	83	67	63	35
TIME OF TRAVEL THROUGH STORAGE AND BURNING ZONE (days)	3.8	2.5	5.4	2.8
Average kiln cross-section, square feet burning and storage zones	70	60	65	41.7
Pounds of lime per square foot, average kiln cross-section (burning and storage zone cross-section)	530	750	308	504
RELATIVE TIME GAS REQUIRES TO TRAVEL THROUGH KILN	124%	100%	93%	53%
Shaft gas velocity relative	.63	1.0	.44	.55
Shaft and storage space velocity relative	.71	1.0	.41	.67
CUBIC FEET EFFECTIVE KILN CONTENT PER TON OF LIME	161	107	225	121
Storage cubic feet per ton of lime	93	62.5	146	57.6
Shaft cubic feet per ton of lime	67.7	40	79	63.4
Cooler cubic feet per ton of lime	15.8	15.1	24	15.7

*Based on a paper read before the 1925 convention of the National Lime Association.

In the tabulation, an effort was made to reduce the factors so comparison is possible. The kiln shaft cross-section is important. If the kiln shaft is kept well filled with gas, a distance across the eyes of 6 ft. is permissible; if not, 5 ft. may be too much. The gas in the shaft must move at a good velocity, otherwise there will be channeling and re-circulation and both kiln efficiency and capacity will drop off rapidly. The difficulty with M kiln was that not enough gas entered the kiln to properly fill the shaft, so channeling took place and while there was a great deal of heating surface in the kiln, much of it was not working, since the gas was not equally distributed. In Kiln G with high gas velocity in the shaft and storage zones, there is little short circuiting; all the space is working and so is all the surface.

One would think a kiln having a high kiln content per ton of lime would be more efficient from the fuel standpoint because there would be more surface to absorb the heat. Yes, but that surface must be working and in M it is not, while in G it is, so G is very efficient in spite of low surface while

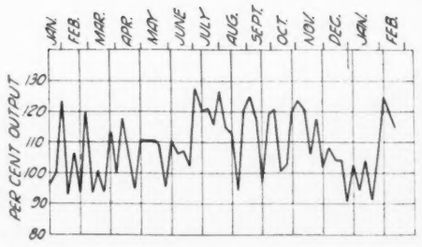


Fig. 15. Showing great variation in kiln output from week to week

different ledge in the same quarry was used, and after another two weeks, the first stone was again burned, all in the same kiln. The difference was 60 bushels per day and was mainly due to the white stone containing more spalls; in part though it was due to the fact that the white stone was less crystaline than the gray, which has an effect upon heat conductivity. However, if the draft were increased when the white stone was burned, and a proportionately greater amount of fuel fired, the capacity would have been the same as with gray stone. It is admitted that conditions will be different

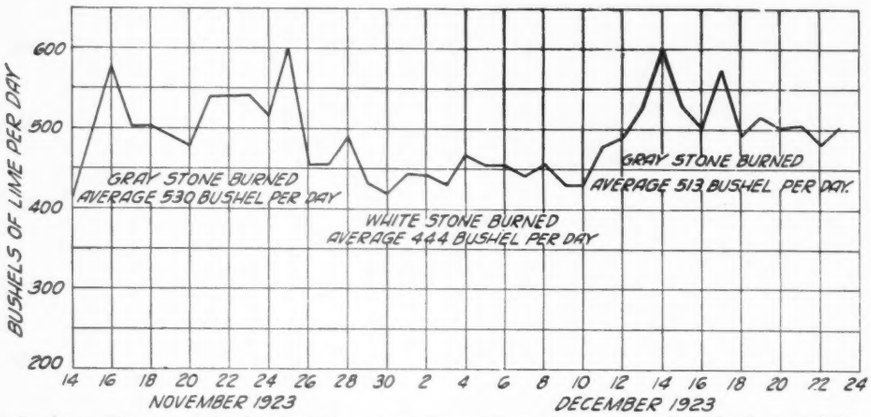


Fig. 14. Effect of the kind of limestone burned on the output of a single test kiln

M is very inefficient from both fuel and capacity standpoints caused by the low gas velocity and consequent poor distribution.

A kiln must also be so proportioned that the lime will travel through the kiln at a proper rate, and that the gas will not leave the kiln in too short a time for it to have a chance to give up its heat. MG has a relative gas travel of only 53% that of G kiln. Naturally in this short time the gases will not be cooled as well as if a longer time had been allowed.

There is a correct height and correct cross-section but what they are, we don't know. The only real way to determine this is to compare kilns on somewhat the basis given in the table, but when this is done, the stone also should be taken into consideration because the stone and especially the lime conductivity varies; and also if the size of the stone is too small it will obstruct the draft, and if too large the heat will not penetrate readily. Fig. 14 shows the influence stone may have. In this case, for two weeks one kind of stone was burned, then for another two weeks stone from a with different stones, but the blame placed on them is too great. They have no such great influence on capacity when of the same chemical composition as it often is claimed.

Most who are told of the high output of G kiln given in the enclosed Table II immediately ascribe the condition to the stone, but in that very plant they have kilns of an ordinary design using the same stone and producing the ordinary 11 tons of lime per day, half only of Kiln G, still they both have the same shaft area. It is not so much the stone as it is the kiln design and operation.

That the character of operation is an important factor is proven by Fig. 15 where output variation of a plant operating the same number of kilns all the time is given. The variation from week to week at times is as great as 25%. In this case, all due to the fact that design is not such as to facilitate proper operation, the stone has nothing to do with it.

To obtain the proper output for a given cubical kiln space, the kiln should be operated efficiently, radiation loss must be low, excess air must be low also, the kiln should be tight and air should enter only where there is fuel to burn.

The eyes should be as large as are practically permitted so that the flame can enter freely into the kiln. For best results there should be a small amount of gas pressure in the eyes. In any case, there should be no draft. If there is no draft, it indicates that all of the kiln draft is used up in friction of hot gas passing up through the kiln and if there is draft, it, on the other hand indicates that kiln can handle more gas, which means that more coal can be burned and more lime made.

For maximum output the kiln top should be closed and kiln equipped with some draft producing equipment, but this must be used very carefully and even with induced draft on top, no draft is allowable at the kiln eyes. The mechanical draft on the kiln top is for the purpose of moving gases through the kiln only and not to produce draft to draw air or gas into the kiln as it is employed at times. If these conditions are satisfied and kiln cross-section in relation to height is right, and stone size within reason, then good capacity and good fuel efficiency will be the result.

(To be continued)

QUESTIONS AND ANSWERS

1. In your article in the July 25 number of Rock Products in discussing the heat lost by radiation you say that if the heat lost by radiation were estimated and the resulting figure be divided by 1378 it would give the pounds of CaO lost. Will you tell me how the heat lost by radiation can be estimated and how the figure 1378 is derived?

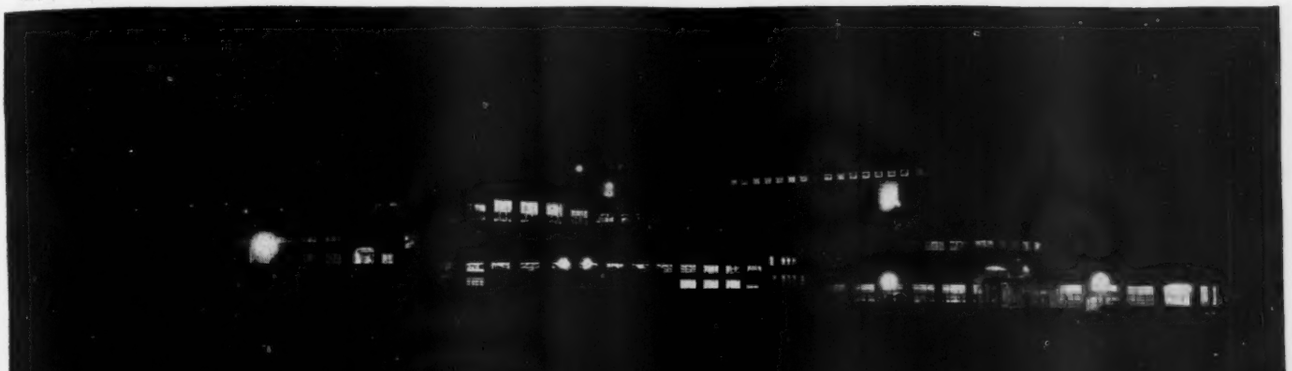
Ans. The heat lost by radiation depends on the surface temperature of the flue and the air velocity surrounding the flue. The surface temperature depends on the insulation of the flue or thickness of the wall and the inside temperature of the flue and kiln. It has been determined by experiment that 1378 B.t.u. of heat are required to decompose the limestone to make 1 lb. of lime.

2. In discussing the insulation necessary you assume a theoretical gas flue of 4 ft. diameter, etc. You say that in this flue the heat loss by radiation is 1000 B.t.u. per hour? By what means is this figure obtained?

Ans. This figure has been obtained from a long series of experimental runs and is indicative of the heat loss from flues of 4½ in. brick lining and an internal temperature of 1200° C. These experiments are discussed and described in Prof. Trinck's book, "Industrial Furnaces."

3. You say that with effective insulation the loss would be only one-fourth. Why?

Ans. The insulation is equivalent to the increased thickness of the walls of the kiln and so the heat would have greater difficulty to penetrate from the internal high temperature to the outer flue surface or kiln lining where it would be dissipated by radiation or air convection currents. This loss has been calculated by Prof. Trinck and figures used are based on his work.



The New Southwestern Cement Plant A Monument to Carl Leonardt

At Osborn, Ohio, Carl Leonardt's Dream of the Ideal Cement Factory Has Come True—Built as Everlasting Memorial to Him and His Splendid Organization

By George M. Earnshaw
Central Representative, Rock Products

IT IS unnecessary to introduce the Southwestern Portland Cement Co. and its president, Carl Leonardt, to the cement industry, for that was done many years ago and it would be conservative to estimate that at least 75% of those materially interested in cement manufacture in this country have seen, or read of, that company's plants in the West, at El Paso, Tex., and Victorville, Calif. Those plants, at the time they were completed, were reputed to be among the finest in the country. However, Mr. Leonardt, while satisfied with them, wanted to go farther and build in the East an even better plant, of the finest design and comprised of the most efficient equipment, that in his mind and in the minds of his engineers, money could buy.

His desire was first voiced about 12 years ago. Engineers were sent into the Columbus-Dayton-Cincinnati district to locate a suitable property, for the company recognized the need for a plant there. The engineers' instructions were most rigid, and it was not until November, 1923, that they "discovered" the property on which the new plant is now located. By April 1, 1924, the property had been purchased and on May 1, of the same year, ground was broken. On May 1, 1925, the first rock was crushed and on June 24, the first car of finished "Miami" brand cement was shipped. It was not a time record, as cement plant construction goes, but to the writer's knowledge, no finer plant has ever been built within the same period, or any period. As for the quality of the cement, it may be mentioned here that the writer saw the company's test record book, which reveals that the cement has shown a compression and tensile strength in three days as called for by the A.S.T.M. in 28 days. (The company invites examination of its tests records.)

The plant is wet process, of 4500 bbl. capacity, with provisions in design for the future installation of major units that will increase its capacity to 6000 bbl. All foundations, walls and floors are of unusually

General view of the plant; at the left is the trestle approach to the crushing plant; the building in the foreground at the left is the grinding department—Above is the same view at night

The quarry is still in an early stage of development; the new electric shovel is the first of its model ever built

Three-yard dipper on the new model shovel; the crushers can take anything it can load

Putting down a row of 35-ft. holes; this drill does 145 ft. of 6-in. hole in 9 hrs.

heavy concrete construction, with plenty of working room around the equipment. The property is of ample proportions so that it was unnecessary to crowd either the buildings or the machinery; on the other hand, the plant is by no means scattered. In designing, special attention was paid to the item of *safety for employes*. For example, every units in the plant, from those driven by ½-h.p. motors to those of 500-h.p., is controlled at the machine by push buttons. The plant is served by its own stone quarry, shale pits and water supply and is powered by its own power plant.

Quarry and Shale Pits

The quarry is about one mile from the plant, connected by standard-gauge track with one siding for passing. Within a short time it will have a face averaging 32 ft. in height. At present the average height is 18 or 20 ft., but the blast-hole machine, now drilling about 30 ft. from the face at one end of the quarry is putting down a row of 35-ft. holes. The length of the face is approximately 2000 ft. A second opening is being made so that eventually the quarry will have a working face totaling 3500 linear feet.

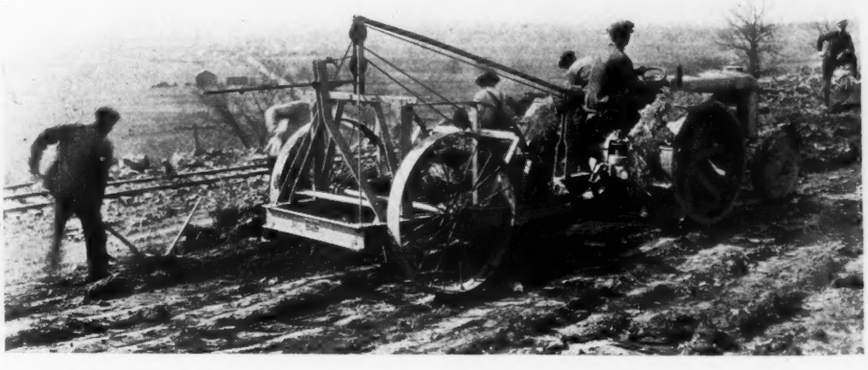
Stripping is comparatively light. A Link-Belt gasoline crane with 1-yd. clamshell bucket, together with two Miami Trailer Scraper Co.'s Fordson outfits, handle all the stripping. The overburden is removed to the dump in motor trucks and is done by contract. Blast-hole drilling is done by a "Clipper" machine and the "pop" drilling by a small Sullivan drill.

Stone loading is done by two Marion shovels. One is a model 61, steam, on crawlers; the other is one of the new model 125, electric, full-revolving on crawler trucks with a 45-ft. boom and 3-yd. manganese-steel dipper. It is the first of its kind installed in any quarry, as the model was but recently announced by the Marion company. It is equipped with the Ward-Leonard control, used with shunt-wound, direct-current motors. The motor generator set is a four-unit outfit consisting of three direct-current generators driven by a 190-k.v.a. synchronous alternating-current motor. Excitation is furnished by an independent 8-k.w. direct-current generator driven by an individual motor. The hoisting engine is gear-driven by a 125-h.p. motor; the rotating machinery by a 30-h.p. motor and the crowding machinery by a 30-h.p. motor. The motors and generators were furnished by the General Electric Co.

Stripping isn't much of a problem, for it is not very heavy

Stone is hauled to the plant in 12-ton Koppel cars of heavy construction, reinforced with 80-lb. rails. There are 24 of these. Two 52-ton Vulcan steam locomotives handle the cars between the quarry and plant.

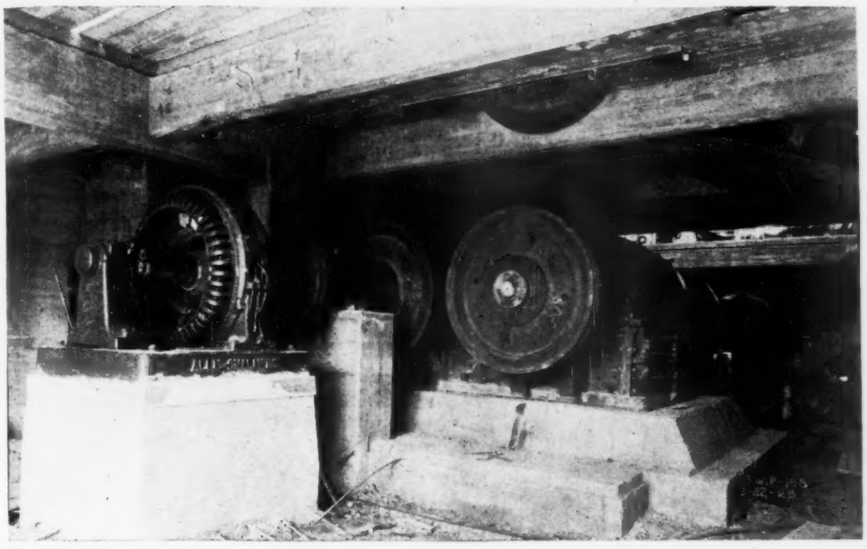
The shale pits are located at Zanesfield, Ohio, about 40 miles from Osborn. Shale is drilled by a No. 22 "Clipper" blast-hole drill with crawler treads and is loaded into standard railroad cars by a Link-Belt gasoline crane with 1-yd. manganese steel bucket. The shale is unusually uniform and is said to be some of the finest in Ohio. It is an oil shale and has a 10% fuel value.



This outfit follows behind the stripping crane and "cleans to the bone"

Here are twenty-three 12-ton loads of stone ready to be dumped in the crushers

One of the stone hoppers; note the push-button controls for handling loads and empties



One of the two specially designed crushers; it has two shafts and two 100-h.p. synchronous motors; its capacity is 250 tons per hour and it takes anything that a 3-yd. dipper can load into a car

The general storage is unusually large, being 100x400 ft.; the 16,000-lb. capacity crane, with 105-cu. ft. capacity bucket, travels its full length

Crushing Plant

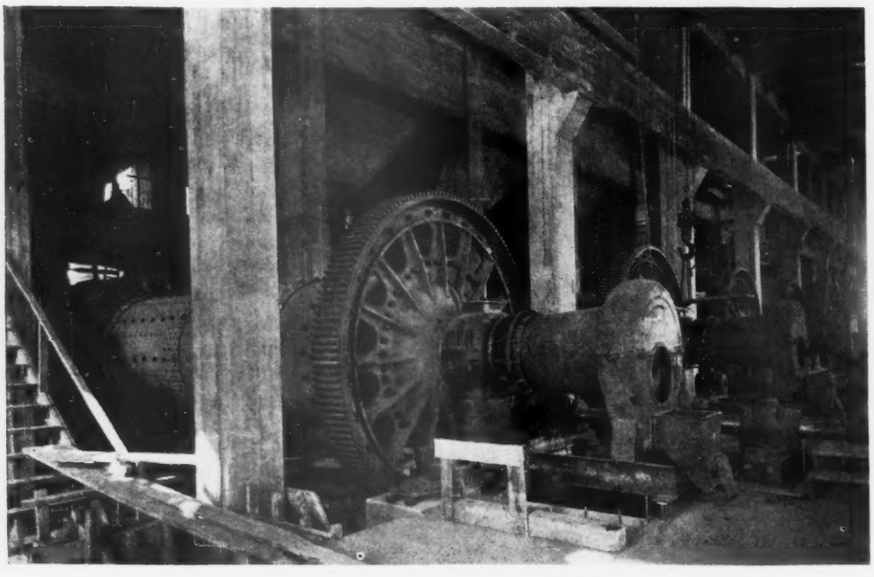
Trainloads of stone from the quarry are placed on a siding on a concrete trestle approach to the crushing plant, and the locomotive is then free to pick up empty cars and return to the quarry, because the handling of loaded and empty cars at the plant is entirely automatic. This is effected by a single-drum Thomas hoist, gear-connected to a 50-h.p. motor. (All motors hereinafter mentioned were furnished by the Allis-Chalmers Manufacturing Co., unless otherwise described.) The hoist is furnished with a 1¼-in. cable, operating in sheaves and

One of the bucket elevators; note the overhead crane for repair parts

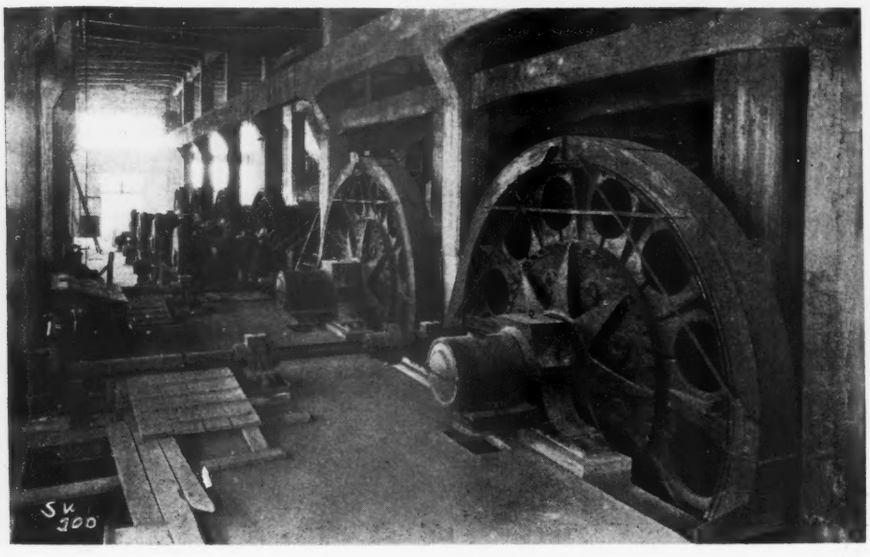
roller carriers, which pulls the loads to the crushers, and the empties away, the operation being entirely controlled, including the hooking and unhooking, by one man at the push buttons near the dumping point. A small hoist overhead aids in tipping the cars to dump and righting them again.

The cars dump into either one of two 10x14-ft. steel-lined concrete hoppers, there being an individual hopper for each crusher. A 60-in. Jeffrey pan conveyor of 50-ft. centers, carriers the stone from the hopper to the crusher, in both cases. Shale cars come in on a track paralleling the stone track, but beyond it (from the crushers), and dump in a track hopper of steel construction measur-

Close-up of one of the raw mills and its revolving table-type feeder (four of these)



The discharge end of one of the raw mills; it is 28 ft. long, with two diameters, 8 ft. and 6 ft.



Four raw mills and two 7x26-ft. compebs; besides there is a 6 ft., 6 in. x 40 ft. finish compeb

ing 16x40 ft. The same pan conveyors handling the stone carry the shale to the primary crushers.

The two primary crushers, which are identical, are of a special type, and are in effect equivalent to two hammer-type crushers in one, there being two shafts on each crusher, each shaft driven by a 100-h.p. synchronous motor through a 40-in. Cutler-Hammer magnetic clutch. They are so constructed that they cannot choke under any conditions. When conditions are normal, for instance, in crushing clean, shovel-loaded stone, their capacity is 200 to 250 tons each per hour. At the time of the writer's visit, their output was down to around 180 tons per hour, because of being in the midst of opening the new quarry, from which the stone was very dirty with a considerable portion of heavy sticky wet clay mixed in. The crushers are capable of crushing, to raw-feed size, a block of stone as large 36x78x18 in.

Normally, shale is crushed in one crusher and stone in another; or, stone can be crushed in both crushers on one shift and shale in both on the other shift. This is made possible by the conveyor arrangement between the crushers and storage. There are two 40-in. cross pan conveyors, running in the same direction under the crushers. The No. 1 crusher can discharge into an elevator leading direct to general storage, or it can discharge to the pan conveyor allowing the product to join that of the No. 2 crusher, which is carried to a 54-in. elevator, driven by a 50-h.p. motor. This elevator was designed by the Southwestern company and manufactured by the Jeffrey Manufacturing Co. Its capacity is 500 tons per hour. It empties into a large steel hopper, the discharge of which can be diverted to either of two "Torpedo" conveyors. One of the conveyors serves the raw mills' bins and the other discharges into general storage. They are each driven by a 20-h.p. motor through Link-Belt silent chain drive.

Returning to the crushers: Briefly described, either crusher or both, can crush either product, or both crushers can crush one product and the crushed product be sent either to the bins above the raw mills or to the general storage. This flexibility insures the independent operation of the crushing department and the grinding department.

Storage

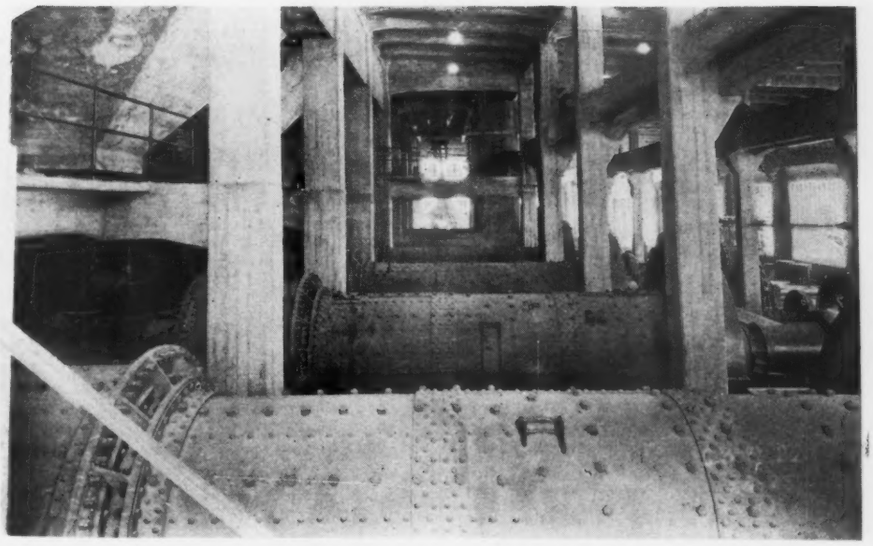
The general storage is larger than found at the average cement plant, its dimensions being 100x400 ft. A 16,000-lb. capacity Pawling & Harnischfeger crane with a span of 98 ft., carrying a 105-cu. ft. capacity Blaw-Knox "Speedster" bucket, runs the full length of the storage.

The raw grinding mills' bins extend the full width of the storage at one end and may be filled by the crane from storage or direct from the crushers. There are no conveyors for handling materials either into or out of storage, with the exception of a "Torpedo" conveyor which conveys the clinker into storage when the clinker tanks are full.

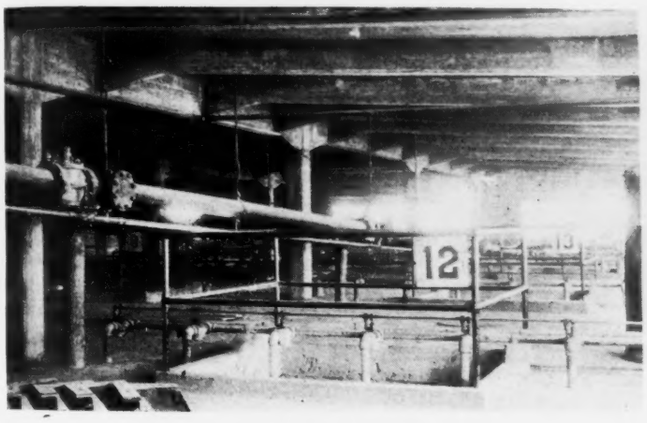
Grinding Department

The raw grinding department, while similar in some respects to that of the average plant, has many unique features. There are four mills of a special design but of the three-compartment type. They are 28 ft. long and have two diameters, 8 ft x 6 ft. Each is driven by a 400-h.p. synchronous motor through a 60-in. Cutler-Hammer magnetic clutch. Excitation is supplied by a 60-k.w. direct-current generator driven by a 90-h.p. motor.

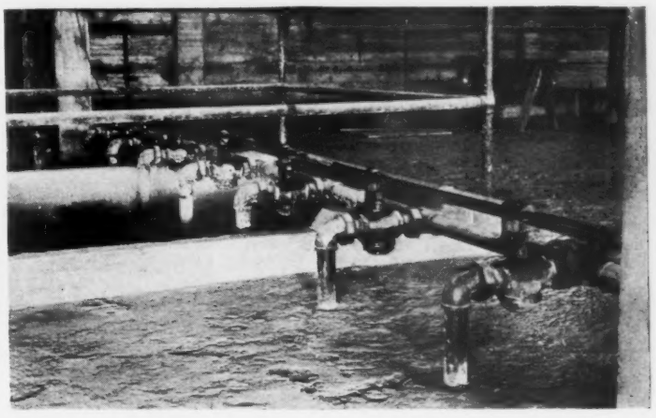
All shale is ground in one mill, with 55% water. The shale slurry as discharged from this mill is pumped by a 6-in. Wilfley centrifugal slurry pump to the hoppers above the remaining three mills. These hoppers are of a special design, being in effect a "two-in-one" bin; that is, a small compartment for shale slurry is integral with the stone hopper. From the tanks the slurry is fed through individual feed equalizing tanks directly into the mills through a 6-in. pipe line.



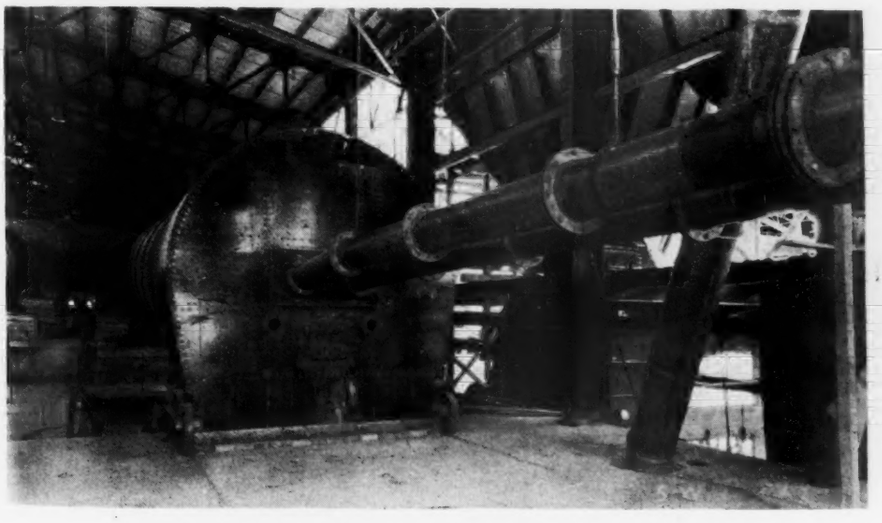
This view affords another glimpse of one of the specially designed feeders on the raw mills; a glass partition will be built between the mills and their motors



On top of the fifteen slurry tanks; five of them are used exclusively for blending



A close-up of a set of headers on one of the tanks; note how the valves are operated by cams



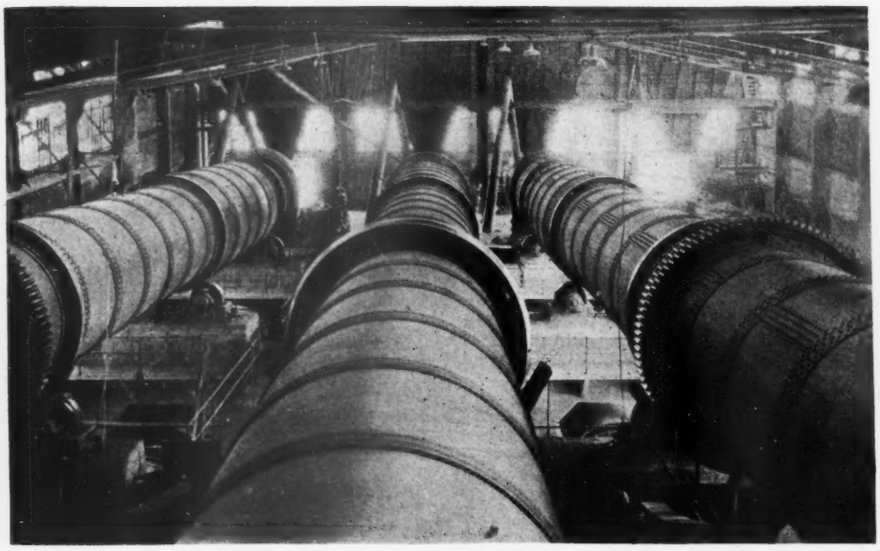
One of the three kilns; the blowers are of a special design

Stone is fed into the mills by special designed feeders. These may be described as being of a revolving table-type design, set at an incline to discharge into an inlet chute to the mill and permit unusually close regulation of feed. They are each driven by a 2-h.p. motor through a speed reducer. (All speed reducers in the plant were furnished by the D. O. James Manufacturing Co.)

The finish grinding department is in the same building with the raw mills, all mills and motors of both departments being in alignment. A glass partition is to be erected between the motors and the mills, so that the motors may be entirely separate from the mills. Two of the mills are standard 7x26-ft. "compeb" units and the third is a specially designed 3-compartment "compeb," 6 ft., 6 in. in diameter by 40 ft. long. These were all furnished by the Allis-Chalmers Manufacturing Co. except the last mentioned mill. They are driven by 500-h.p. synchronous motors through 60-in. Cutler-Hammer magnetic clutches.

Slurry Handling and Storage

The slurry discharges from the raw mills into a common (underground) sump from which it is picked up by two specially designed air-lift pumps and pumped to slurry storage and blending tanks. There are 15 of these, of concrete construction, each 23



A good view of the three kilns from the feed platform; the center kiln was turning when this photograph was made

ft. in diameter and 37 ft. deep, having a capacity of 1200 bbl. each. They are arranged in three rows of five tanks each. The first row is used for blending and the other ten tanks are used for kiln feed.

Slurry agitation is accomplished entirely by compressed air and there is not a mechanical agitator in the plant. A 2-in. air line passes over the tanks and from it seven 2-in. headers extend into each tank. On each header there are six 1-in. lines which extend to within 4 in. of the bottom. This gives each tank a total of forty-two 1-in. air lines for agitation; it may be noted here that it has never been necessary to clean out any of the tanks.

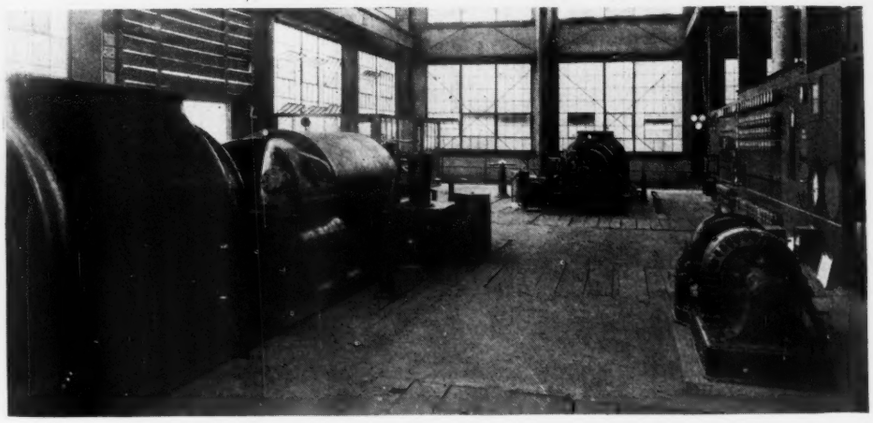
Control of this method of agitation is effected in an efficient but simple way. Each of the seven headers on a tank is fitted with a valve. The seven valves are in alignment so that a cam-shaft extending over them operates them alternately, giving an accurately timed distribution of air to every square foot of the tank. The cam-shafts over all of the tanks are gear-driven from a single shaft, so that the whole system is operated by one motor. (A set of headers, with valves and cams, is shown in one of the illustrations.)

Under each row of tanks is a 12-in. line for removal of slurry to two specially designed air-lift pumps. One of these is used exclusively for blending in the first row of tanks, and the other pumps direct from the other ten tanks to a large tank over the feed end of the kilns.

Burning

Slurry is fed to the kilns through revolving "S"-type feeders, each driven by a 2-h.p. Star motor of variable speed with 32-point control, through a speed reducer. The "S" feeders are of the company's own design and have been used successfully at its other plants.

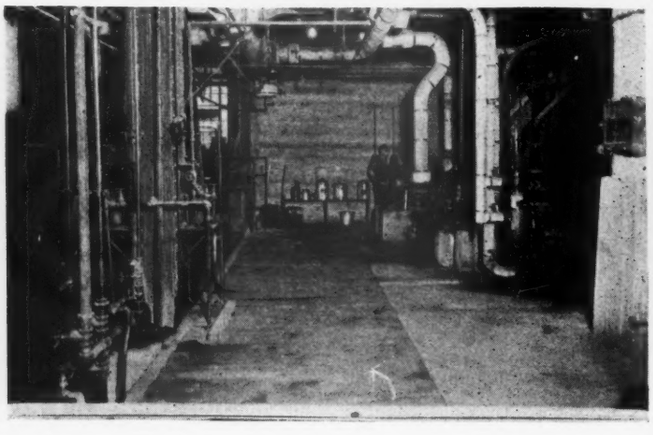
The three kilns are 11 ft. 6 in. and 10 ft. x 175 ft., each driven by a 50-h.p. variable speed motor through a speed reduction unit. Two of the kilns were furnished by the Allis-Chalmers Manufacturing Co., and the other by the Traylor Engineering and Manufacturing Co. Pulverized coal is blown into the kilns by specially designed heavy cast-iron high-pressure blowers, direct-connected to 60-h.p. motors. The kilns are lined with a high-grade neutral clay firebrick. With the exception of the burning zone and the upper 40 ft. they are insulated with 3 in. of "Sil-o-cel." A temperature of 1000 to 1100 deg. is maintained at the kiln exits.

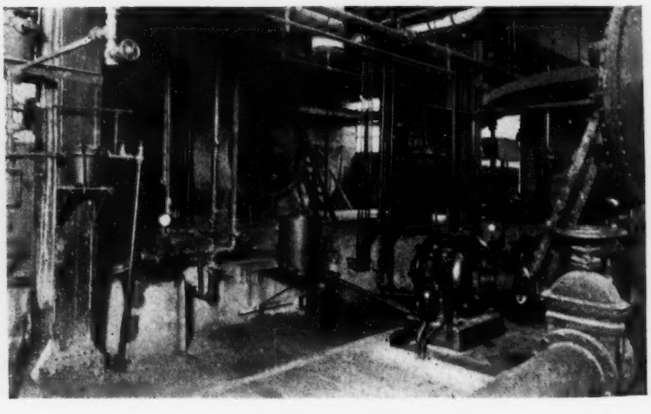


Interior view of the power plant showing the turbines, exciter set and switchboard

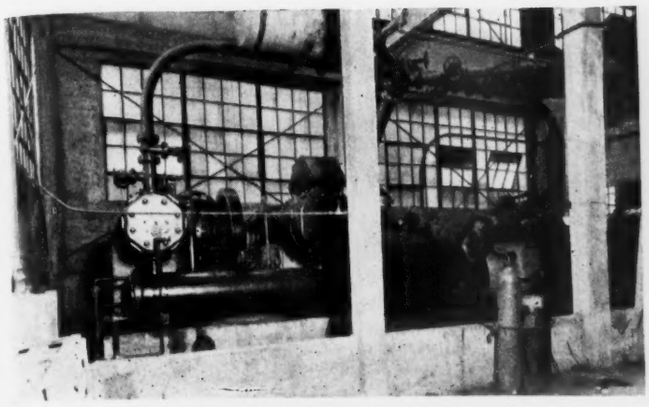
Power Plant

Gases and dust from all three of the kilns are received in a common flue. All of the

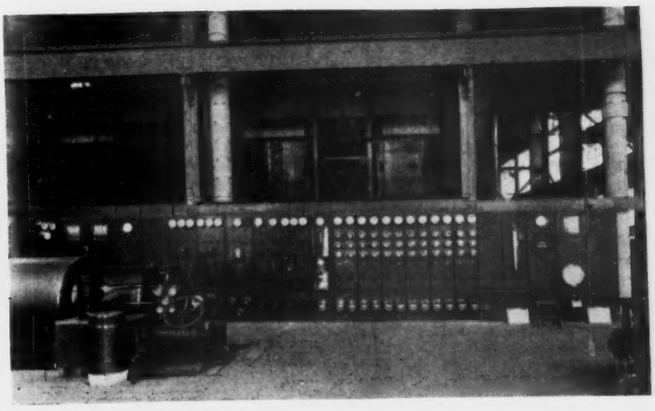




Basement view of power plant showing feedwater pumps. At left is evaporator, and at right, condenser on the 3000-kw. turbine



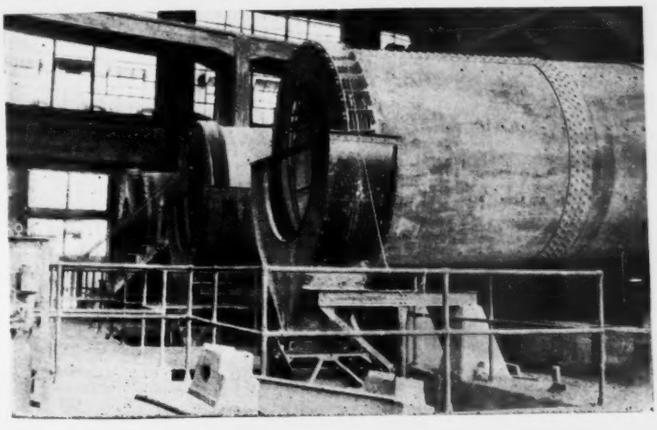
One of the two 850-cu. ft. air compressors



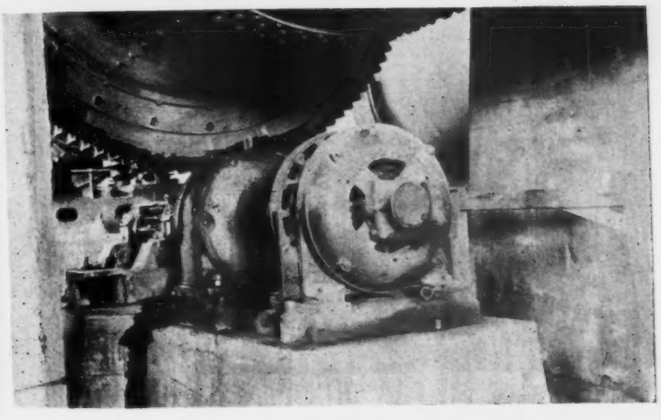
Switchboard, electrically operated with oil switches

Waste-heat boilers with economizers and exhaust fans

Precipitation plant (behind screen three 10-kw. transformers)

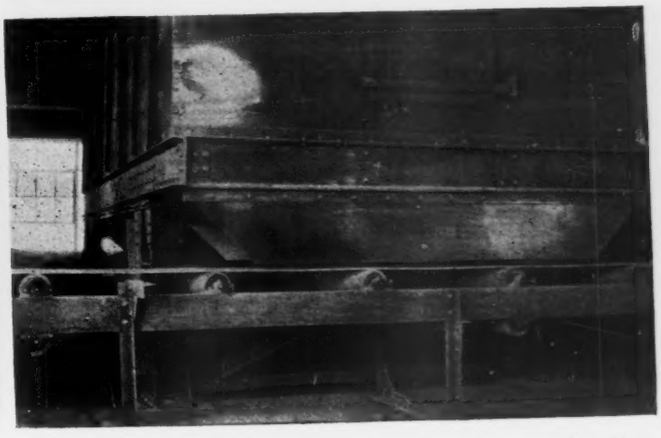


Ends of coolers; clinker drops to "Torpedo" conveyor



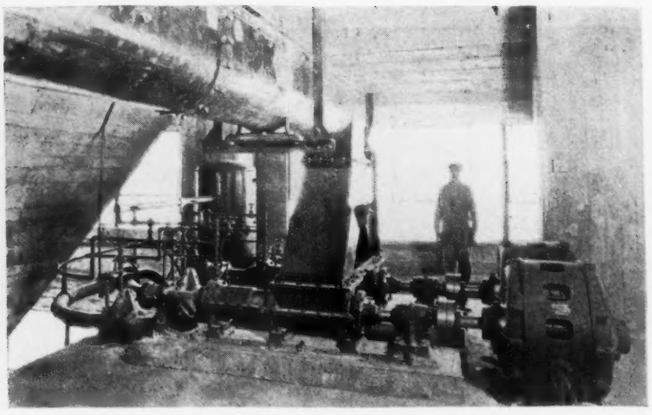
Cooler drive; typical of all speed reducer installations

For bags from cleaner to a chute to floor below



A portion of the bag cleaner and conveyor serving it

One of the dust arresters' cabinet, fan and motor; it was not operating when this photo was taken



Cement pumps, located under the silos, keep the packing machines' bins full all the time

kilns are equipped with dampers and likewise the waste-heat boilers, so that any kiln, or kilns, and any boilers, or boilers, can be cut in or out, independently of the others.

There are three 1047-h.p. Babcock and Wilcox waste-heat boilers, each equipped with a horizontal tube economizer, manufactured by the Green Fuel Economizer Co., and a direct-connected exhaust fan driven by a 100-h.p. variable speed General Electric and Manufacturing Co.'s latest design, dead-front type, remote controlled. It is electrically operated with cell-mounted, high-voltage, oil switches. As already mentioned, every piece of equipment in the plant is individually controlled by push-buttons at the machine. This sysfem not only affords complete safety, but is a big factor in the reduction of labor costs. Gas temperatures are recorded by Brown multiple recorders while Cochran flow meters are used for recording steam flow; Bailey gauges are used for draft checking.

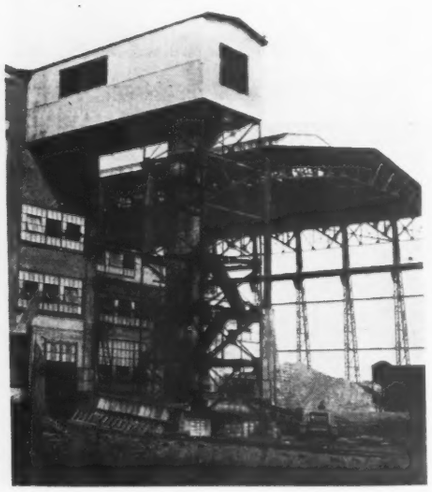
The power plant's evaporating system provides a water purification efficiency of ¼-grain per gallon. After storage, however, this is increased to approximately one grain per gallon. The 1500-k.w. turbine has a 3000-sq. ft. condenser with a 3500 g.p.m. circulating pump and the 3000-k.w. machine has a 6000 sq. ft. condenser, with two pumps, one of 5000 g.p.m. and the other of 3500 g.p.m. capacity. Storage of 35,000 gal. of distilled water is provided in an underground concrete tank.

The spray pond, several hundred yards distant from the power plant, has a maximum spray capacity of 13,500 g.p.m. It is of reinforced concrete construction and is 102 ft. wide by 365 ft. long, 4 ft. deep and has a capacity of 1,000,000 gal. Five shallow wells are available to supply water for the whole operation, although the use of only two is now necessary. In each well a 4x4-in. Allis-Chalmers centrifugal pump is mounted within suction lift of the bottom of water gravel. These pumps have a capacity of 350 g.p.m. and are motor driven.

Precipitation Plant

From the waste-heat boilers the exhaust fans pass the gases to a collecting flue leading to the precipitation plant. The Cottrell system, furnished by the Western Precipitation Co., Los Angeles, Calif., is used. The plant consists of three 10-k.w. transformers, which step up the current from 440 to 50,000 volts. Synchronous motor driven rectifiers pass the 50,000 volts, direct current, to the plates for precipitation.

The plant is comprised of four treaters, each having four sections of reinforced-con-



Coal elevator and conveyor leading to the coal plant; the coal unloading tipples have not been built yet

tric motor. Steam is generated at 225 lb., 150 deg. superheat. One of the boilers is equipped with a Fuller-Lehigh powdered coal burner so that it can be used either as an auxiliary unit or as a waste-heat boiler.

The plant consists of one 3000-k.w. and one 1500-k.w. turbine generators, generating current at 3-phase, 60-cycle, 2200-volts. (All motors of 50 h.p. and more operate on 2200 volts and those under 50 h.p. on 440 volts.) Two 850-cu. ft. Ingersoll-Rand air compressors, direct-connected to 175-h.p. synchronous motors, furnish the air for the whole plant.

The switchboard is of the Westinghouse

This crane takes care of the storage of several hundred carloads of coal until the tipple is built, which will handle 8 cars of coal at one setting

crete plates. Each treater is designed to have ample capacity for one kiln with a precipitation efficiency of 98%. Consequently, the precipitation plant is of excessive capacity as long as it has only the three kilns to serve. The plant's single stack is 190 ft. high, 18 ft. in diameter at the bottom, and 14 ft., 6 in. in diameter at the top; it has no lining.

As dust is precipitated it drops into a 9-in. spiral conveyor, driven by a 5-h.p. motor through a speed reducer, which feeds a Fuller-Kinyon pump. Thus, instead of being spread over the village of Osborn and vicinity, the dust is pumped back and automatically fed to the kilns as created.

Clinker Handling and Storage

There are three clinker coolers, 8 ft. in diameter by 80 ft. long, each driven by a 30-h.p. motor through a speed reducer, and were furnished by the Vulcan Iron Works. From them the clinker discharges directly on a "Torpedo Rinne." ("Rinne" is the German word for conveyor.) A "Torpedo Rinne" is of steel construction and operates like a shaker, actually throwing or sliding the material, rather than conveying it. (This general type of conveyor is not new in this country, having proved especially practical in power plants for coal and ash handling. These are the first of this particular type to be used in this country. They are low in power consumption and very economical in repairs.)

The torpedo conveyor handling the clinker from the coolers can discharge at three different points: The first point is a cross conveyor leading directly to the finish grinding mills; the second point is into an elevator leading to the clinker storage tanks; the third point is into an elevator which discharges into the general storage, which provides space for 500,000 bbl. of (ground) clinker, in addition to 100,000 bbl. in the three clinker tanks.

At a point midway of the elevator serving the clinker tanks and the one serving storage, a third "Torpedo" conveyor crosses the main conveyor. This one is used for conveying clinker from either the tanks or from the hopper in the general storage, which is kept filled by the crane. Thus, the clinker handling facilities are very flexible, for it is possible to convey directly from the coolers to the finish grinding mills or to the storage tanks; or, if the tanks are full, it can continue on to the general storage. The three clinker tanks referred to above are circular and are of concrete construction. They are 67 ft. high and 50 ft. in diameter, each having a capacity of 35,000 bbl.

Gypsum Storage

Between two of the clinker tanks are interspaces for gypsum storage which accommodate a 90 days' supply. These are filled by an enclosed chain-bucket elevator which is served by a belt conveyor running through a tunnel under the general storage. The conveyor will extend from a point underneath a track hopper outside the general storage. This hopper is in the rock track outside the crusher building temporarily and until the tunnel is completed, the procedure is to have the railroad cars of gypsum enter directly into the storage to be unloaded by the crane, which deposits the gypsum in a hopper feeding the elevator, which takes it to the interspace bins. Gypsum is fed directly through a positive feeder to the "Torpedo" conveyor which leads to the finish grinding mills' bins.

Cement as discharged from the finish grinding mills is conveyed to the silos by the Fuller-Kinyon pumping system, the arrangement permitting the by-passing of the cement direct to the bins above the packers, if desired.

Isn't this machine shop a beauty?

Silos and Packhouse

There are ten silos, 80 ft. high, having a combined capacity of 250,000 bbl. Under them are four rows of screw conveyors, each driven by a 30-h.p. motor through a gear reduction unit. The conveyors empty into two cross conveyors, running in opposite directions, emptying, through rotary screens, into two Fuller-Kinyon pumps which discharge into the packing machines' bins, the capacity of which is 315 bbl. each. In the packhouse proper there are four-3-spout Bates packers with Belt conveyors for railroad loading. In addition, there are two 3-spout packers in a separate wing of the packhouse for truck loading. Double tracks pass on each side of the building.

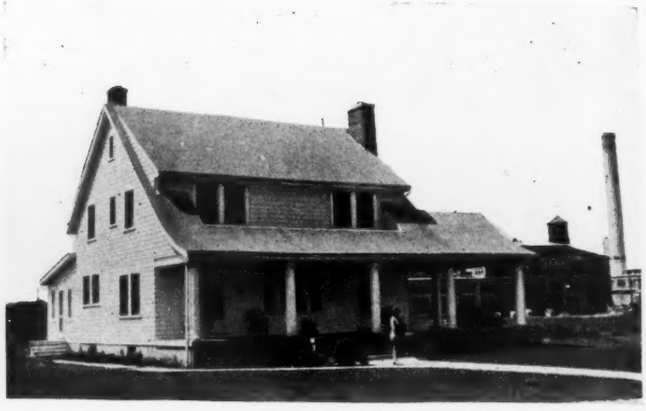
The packhouse has four floors: The first is for the packing and handling of sacked cement exclusively; the second is exclusively for the storing of cleaned bags; the third is for the cleaning, sorting, sewing and tieing of bags, while the fourth is for the storage of sacks before being put through the rotary cleaner. Belt conveyors, 30 in. wide, furnished by the B. F. Goodrich Rubber Co. and driven by 5-h.p. motors through speed reducers, convey the bags to and from the cleaning machine, which was furnished by the H. W. Caldwell Co. The fourth floor also provides space for the W. W. Sly Co. dust arresters' cabinets, fans and motors. Every dusty point in the packhouse is provided with a collector, so that inside and outside, the entire plant is dustless.

The company is now using a temporary 18-in. belt conveyor, extending from a track hopper through a concrete tunnel, to an enclosed chain-bucket elevator, 18 in. wide, of 50-ft. centers. The elevator discharges on a 24-in. belt, equipped with a Merrick "weightometer," leading to the coal dryer stock bins.

The conveyor discharges into two Fuller-Lehigh vertical-type dryers of 10 tons per hour capacity. Hot air for these dryers is obtained exclusively from the clinker coolers, first being drawn through specially designed dust eliminators, which also reduce the temperature from around 900 deg. to 260 deg. (The temperature is gauged by recording pyrometers.)

From the dryers the coal is fed through revolving table-type feeders (similar to those on the raw mills), into two 5 ft. 6 in. x 40 ft. special designed ball tube mills, each driven by a 300-h.p. synchronous motor through a 60-in. Cutler-Hammer magnetic clutch. The mills are equipped with a special designed air-sweeping outfit. They discharge into a 14-in. spiral conveyor (all spiral conveyors furnished by the Jeffrey Manufacturing Co.), driven by a 15-h.p. motor through a speed reducer. The tail

Storeroom and machine shop; connected by traveling crane



Clubhouse is for the convenience of officials and guests

end of the conveyor is fitted with a Link-Belt gear and silent chain drive for driving a cross spiral conveyor leading to two Fuller-Kinyon pumping outfits, one of which is used only as an alternate. The dried powdered coal is pumped direct to the bins over the firing end of the kilns, and also to the bin for the special coal fired auxiliary boiler.

Machine Shop and Storeroom

The machine shop and storeroom are separate buildings, each 55 ft. wide by 100 ft. long, located end to end with 30-ft. driveway between and connected with an overhead electric travelling crane. The storeroom is provided with every modern facility for the storing of spare parts and equipment, including an elaborate record filing system. Duplicate parts for every machine or piece of equipment in the plant are kept in the storeroom constantly, including complete motors and speed reduction units.

The machine shop is complete in every detail. Every machine is driven by its own motor. The shop's equipment includes: A 24-in. shaper; a 24-in. engine lathe; a key-seater; a large and a small power hack saw; two high-speed drills; a 4 ft. radial drill; a combination punch, cutter and shears; a set of rolls; a power hammer, with 250-lb. ram; a pipe cutting machine; a pipe threading machine and a complete set of emery wheels. A 5-ton Northern overhead electric crane travels the shop's full length and into the storehouse. It is conceivable that any piece of equipment in the whole plant or quarry can be handled and repaired in this most modern machine shop.

Personnel

The designing of the plant was done by the company's own engineers, based on the ideas of Mr. Leonardt, Chief Engineer Rieth, Mr. Binford, Mr. Coghlan and Mr. Arnold. The company also did its own construction work, excepting the silos, slurry and clinker tanks, which were designed and built by the MacDonald Engineering Co.

The officers and operating personnel of the Southwestern Portland Cement Co. at Osborn are as follows: Carl Leonardt, president; C. C. Merrill, first vice-president, and C. A. Fellows, second vice-president, all of Los Angeles, Calif; A. Courchesne, vice-president, and James G. McNary, treasurer, both of El Paso, Texas; O. J. Binford, secretary, Dayton, Ohio; F. H. Powell, director and sales manager of plant "B" at Victorville, Calif., who gives considerable of his time to the Osborn plant; W. C. Rieth, chief engineer, W. T. Groner, superintendent, R. R. Coghlan, chief chemist, and Chas. D. Clugston, sales manager, all of Dayton. The general offices for the company's plant "C" (Osborn, Ohio) are at 211-220 Mutual Home building, 42 N. Main street, Dayton, Ohio.

Precipitation plant, silos and packhouse; a wing of the packhouse (extreme right) is for motor track loading exclusively

See Modern Merchandizing Methods Applied to All Building Materials

BUILDING MATERIAL manufacturers throughout the country, by their various expedients for keeping up home construction as the national housing emergency passes into history, are borrowing lavishly from the sales policies of retail merchants, according to the *Dow Service Daily Building Reports (New York City)*.

Building material production in nearly every branch of the building construction industry has for the last five years been maintained at an ever increasing rate until today it stands at dizzy heights where a sudden slough would be serious.

Heretofore nation-wide requirement for housing has, in a broad sense, placed the building material industry practically upon an order-taking basis. Recent developments, however, tend to show that old-fashioned selling will soon have to be resorted to, if, indeed, the time has not already arrived for it to be practiced. The most foresighted are already in the field and their method of attack shows, not only that they have an eye to giving reduced cost a prominent place in their program, but they are, in addition, adapting some of the very tactics that the retail merchant had to resort to after the spasm of national thriftlessness had its fling, following the war, in order to approximate the rate of sales they had been writing up before.

Taking a leaf from the paint industry which worked out to practical operation the plan whereby a home owner could paint his house on the installment plan, the common brick manufacturers have a plan, similar in many respects, whereby if a man erects a home of brick, certain financial assistance will be given him by a financing organization sponsored by the manufacturers through local banks.

The lumber manufacturers, not to be outdone in the fierce competition that has arisen in recent years between the manufacturers of cement, hollow tile, lumber and brick, the later vieing, in addition with the face brick manufacturer and both of them, in some parts of the country having to face unitedly, in addition, imported common and face brick, has worked out an appeal to the public along lines peculiar to the nature of its own business.

In their efforts to maintain the popularity of their material this industry makes a drive upon ascending costs, by standardizing its products so that every purchaser of lumber can go into the market and buy exactly the necessary amount of lumber with which to build his home in required lengths and dimensions, thus eliminating waste. This policy is based upon the idea that if a retail merchant sells a standardized article, the chances of dissatisfied purchasers are tremendously lessened. American standards hereafter will provide for lumber that has proper strength, stiffness, superior nail holding power, reasonable resistance to warping and durability in place.

Another indication of the tendency to "sell" building material, appliances, equipment and services is found in the organizations of manufacturers, distributors or installers of these materials that are springing up everywhere pledged to wipe out customs and practices which, because they are wasteful, add to the cost of the structure, whether it be a skyscraper or a modest home.

These organizations like the Portland Cement, National Lumber, Electrical Board of Trade, Structural Steel Board of Trade and the district common brick associations that are being established in large cities all over the country, all offering to place at the hands of the consumer of the products they represent quantities of fair dealing, honest measures and lengths and weights, standards of quality, etc., eloquently bespeak the change that is taking place in the building construction industry.

Better merchandising is the new call in the building material markets of the day. Some branches have undertaken national advertising and publicity campaigns in order to give it impetus, but it is a cry, although long sounded in the wilderness of time-worn cost-consuming practices, that is bringing relief to present day building owners in the form of corrective measures now made mandatory by impending necessity.

An Investigation of the Building Industry by Builders

COSTS and methods of construction in all parts of the country are to be studied during the next thirty days by groups of nationally known builders who will visit more than forty cities. These builders, according to an announcement made here today, plan to carry on the most intensive examination of its own affairs yet made by a major industry.

The builders, acting as executives of the Associated General Contractors of America, will form into five groups this month, meeting in northern cities to follow as many different itineraries that will take them to Dallas, Texas, where a summarizing conference will be held, October 5, 7 and 8.

Coming after three months during which all records for volume of construction carried on have been shattered, the broadcast studies are to be made at a particularly apt time, the contractors feel.

Scrutinizing attention will be directed toward both public and private construction. A large amount of the study devoted to private construction will center in ethical practices of the various elements of the industry. This will lead to a close survey of the methods of financing construction operations. Elimination of certain financing methods now prevalent will result in fictitious building costs being less often presented to the public as excuses for high rental rates.

In connection with public construction work, the contractors expect to develop many facts along the same lines as those which they made public at Washington last May concerning waste of funds by governmental units handling operations without use of competitive contracts.

Of the five groups the one making the first start and with the longest itinerary ahead of it is scheduled to go to Denver from Chicago, thence to the following cities: Salt Lake City, Spokane, Seattle, Portland, San Francisco, Los Angeles, El Paso and Dallas.

A second party will leave Minneapolis September 25, proceeding to Des Moines, Chicago, Indianapolis, St. Louis, Little Rock, Oklahoma City, Dallas.

Starting at Washington, September 27, another group will visit the following cities: Atlanta, Jacksonville, Miami, Birmingham, New Orleans, Shreveport and Dallas.

Boston will be the meeting place of other builders whose itinerary will include Bridgeport, New York, Trenton, Philadelphia, Wilmington, Washington, Richmond, Charlotte and Dallas.

The fifth group will leave Cleveland September 27 and will go to Toledo, Dayton, Cincinnati, Louisville, Knoxville, Nashville, Memphis and Dallas.

New Field Secretary for Associated General Contractors

PORTER S. McCORMICK, who has been in contact with highway contractors for many years, has joined the staff of the Associated General Contractors as a field secretary. His previous associations with the Standard Oil Co. and with the Texas Oil Co., in handling asphalt sales and distributions, have made him keenly cognizant of the problems of highway builders and the manner in which the A. G. C. can best go about aiding in solution of these problems.

Mr. McCormick left Washington headquarters recently to undertake his first field work, which will be situated in Tennessee.

He is a member of several associations whose personnels are composed of men interested in highway affairs, including the American Road Builders' Association and the American Society for Municipal Improvements.

Postpone North Dakota Rate Hearing

THE North Dakota sand and gravel case, brought by the North Dakota Farm Bureau Federation before the State Railroad Commission at Bismarck, has been postponed to a later date, it is reported by N. E. Williams, traffic commissioner of the Fargo Commercial Club. In this case the intrastate rates on sand, gravel and crushed rock within the state of North Dakota are under attack and a lower level of rates is sought.—*Fargo (N. D.) News.*

Clinchfield Portland Cement Corporation Starts New Plant, Clinchfield, Ga.

Another Record Set for Rapid Construction Work—Fuller's Earth Used for One Raw Material

THE new plant of the Clinchfield Portland Cement Corp. just put into operation is one of the most modern and fully equipped wet process plants in the country. The plant is noted for the complete absence of the customary tunnels and underground conveyors, all materials being handled by locomotives and traveling cranes. The general arrangement is in a straight line, thereby causing the materials to travel from one department to the other with a minimum conveying cost. It is located at Clinchfield, Ga., 30 miles south of Macon on the Georgia, Southern and Florida R. R. Here an abundance of soft limestone and fuller's earth have been found at the plant site. Kaolin is supplied from pits located a few miles north of the plant on the above railroad. The first concrete was poured August 2, 1924; and the steam lines were tested out April 10, 1925. Considering that waste heat boilers and complete power generating units were installed, the period of construction may be considered one of record time.

Quarry and Clay Pit

The limestone is so soft that very little drilling and blasting are required. When drilling is necessary it is done with a No. 14 Junior Sanderson-Cyclone drill. Excavating the limestone and fuller's earth is done with a No. 37 Marion full revolving steam shovel mounted on caterpillars. The materials are brought to the crushing plant in 5-yd. side-dump cars hauled by 10x16-in. 4-wheel, 36-in. gauge, saddle-tank locomotives.

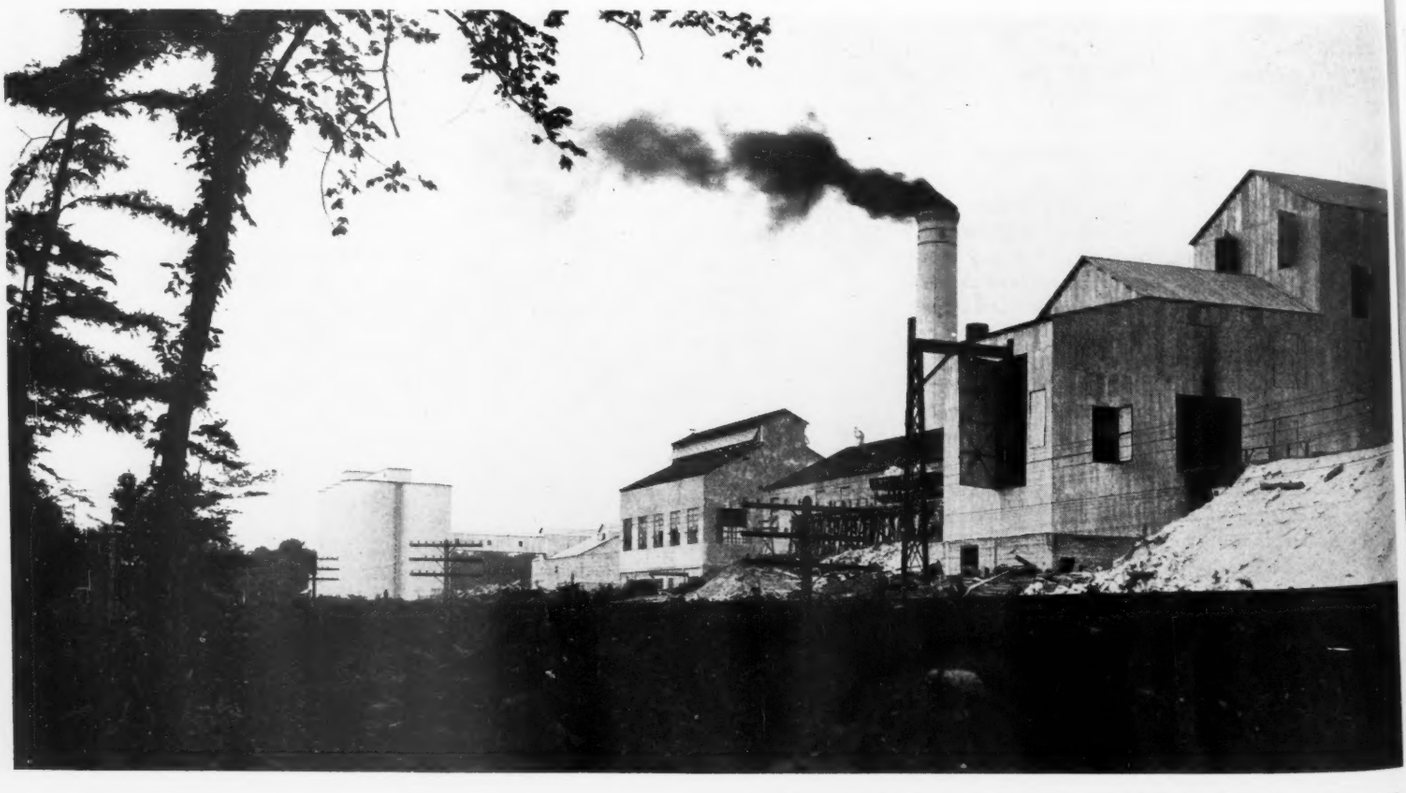
The kaolin is excavated with an Erie type "B" caterpillar mounted steam shovel and brought to the plant at Clinchfield in standard-gauge cars. A spur track enters the clay compartment of the raw material storage, where the cars are unloaded by the traveling crane.

Rock Crusher Plant

Limestone and fuller's earth are dumped from cars directly into a No. 15N Allis-Chalmers gyratory crusher—belt driven by a 125-h.p., 720-r.p.m. slip-ring motor. Materials so crushed discharge directly into a 42-in. pan conveyor feeding a 60-in. by 16-ft. revolving screen operating at 12 r.p.m. and making a product 2 in. in diameter. Tailings from the screen discharge into a 10-in. Worthington high speed crusher producing stone of 2-in. maximum. A 24-in. belt conveyor carries the product from this crusher to the 42-in. conveyor for sizing in the screen. The product of the screen is carried to storage by a 24-in. belt conveyor. This department has a capacity of 200 tons per hour. Limestone and fuller's earth are handled separately.

Raw Material Storage

This department is 75 ft. wide by 320 ft. long with a total storage capacity of 28,400 tons of materials. This is divided into three compartments; stone, 16,200 tons; fuller's earth, 5200 tons; kaolin or clay, 7000 tons. A 6-ton Shepard electric crane equipped with a 2½-yd. clam-shell bucket travels the entire length of the building and distributes



Panoramic view of the new Clinchfield, Georgia, plant of the

the material into storage or into the raw mill, as required.

Raw Mill

Limestone and fuller's earth are deposited by the crane into two large steel hoppers having a total capacity of 184 tons. Each hopper feeds a No. 722 Allis-Chalmers "compeb" mill. The clay is deposited by the crane into a steel hopper feeding a 16-ft. American wash-mill, where sufficient water is added to disintegrate the clay and make a thin slip or slurry. This slurry then passes by gravity into a 18-ft. diameter by 12-ft. deep agitating basin. Both the wash mill and agitating basin are driven by motors direct-connected through Foote gear reducers.

Clay is fed to the "compeb" by means of rotary bucket wheel feeders and the feed is accurately controlled by means of a Moore and White speed reducer.

Water is added at the "compebs" to the extent of 36% by weight of the slurry.

The "compeb" mills are direct-connected to General Electric 500-h.p. super-synchronous motors—180 r.p.m. The capacity of this department is 3000 bbl. per day and it is so arranged that another unit can be easily added.

Slurry Storage

Leaving the "compeb" mills the slurry is elevated to three correcting basins, each having a capacity of 217 bbl. These discharge into two mix basins containing 770 bbl. each. After the slurry has been thoroughly agitated it is elevated into three 1000 bbl. storage basins. The slurry is handled throughout with malleable iron buckets equipped with manganese steel chains. All storage basins and elevator casings are of concrete built with continuous sliding forms. The slurry is agitated mechanically as well as with air.

The agitating machinery was furnished by F. L. Smidth & Co. and is direct-connected to motors through Foote speed reducers.

Worthington feather valve compressors furnish air for agitation. High or low pressure air may be used, as required.

Kiln Building

Slurry from the storage basins is elevated to two bucket wheel feeders, each feeding a 10-ft. diameter by 175 ft. long rotary kiln, furnished by Allis-Chalmers Manufacturing Co. The kilns are operated by 75-h.p. 720 r.p.m. slip-ring motors through silent chain drives. The first 40 ft. of the kilns are lined with high grade fire-brick. The next 105 ft. are insulated with 3 in. of calcined "Sil-o-cel" under fire-brick and the last 30 ft. are again lined with a good grade of fire-brick.

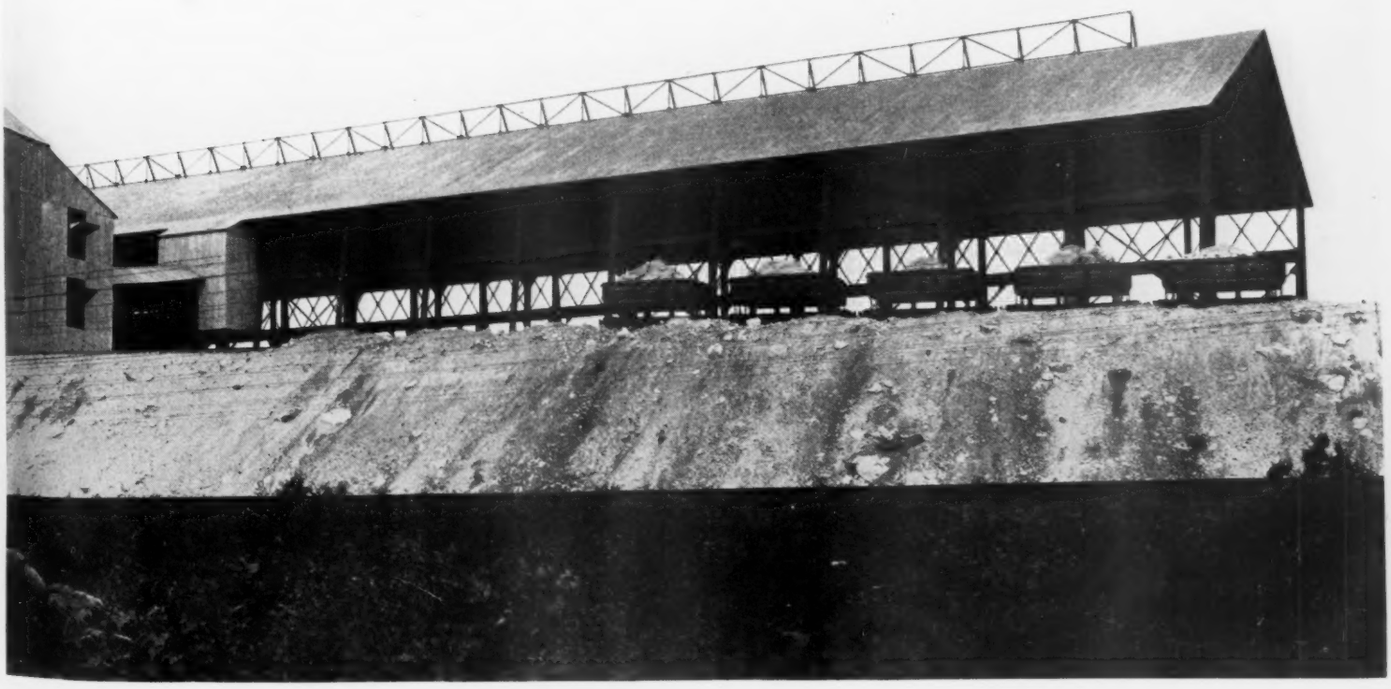
The kilns discharge into pits from which clinker is elevated and discharged into the storage yard. Air seals are provided at both ends of the kilns so that any air entering the kilns from any other source than the fans must pass over hot clinker in the pits and become preheated.

Each kiln is equipped with Allis-Chalmers coal-feeding apparatus attached under bins, each having a capacity of 29 tons of pulverized coal. Sensitive adjustment of the coal feed may be obtained by Moore and White speed reducers. Air for combustion is furnished by No. 9 American blowers direct-connected to 20-h.p. 1200 r.p.m. motors.

Clinker Storage and Clinker Mill

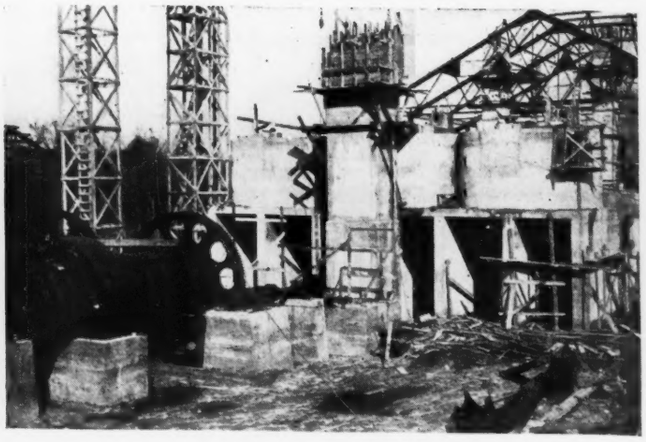
Clinker is distributed into a storage space 75 ft. by 200 ft. having a capacity of 75,000 bbl. Additional storage is available, if required. For the present a locomotive crane moving over a standard-gauge track along either side of the storage will handle clinker into the mill by lifting it into a large concrete receiving hopper built integral with the finish mill wall. Under this hopper is located a 36-in. "poidometer" which weighs the clinker coming into the mill.

Gypsum is stored in a large concrete bin having a capacity of 550 tons. It may be unloaded directly from cars or taken from storage and elevated into a steel hopper over a 14-in. "poidometer" which weighs the required amount of gypsum. The poidometers are so arranged that the materials discharge together into the boot of an elevator. A drag conveyor carries the material from the head of the elevator into two steel storage bins having a total capacity of 294 tons. Two Bradley "Hercules" mills located beneath the above bins serve as "break-down mills" for two 7-ft. by 22-ft. Allis-Chalmers tube mills. The product of the Hercules mills, passing a 20-mesh screen, is raised by elevator to another drag conveyor which in turn carries it to the two large steel bins over the tube mills. The capacity of this department is amply large to take care of future expansion. For the first two kilns it will only be necessary to run one of the two



Clinchfield Portland Cement Corporation of Kingsport, Tennessee

Construction view showing kilns and waste heat boiler



Construction view showing raw-grinding department and concrete correcting basins

units, the serving as a reserve.

The "Hercules" mills are direct-mounted to 300-h.p. super-synchronous motors. The tube mills are driven by means of 500-h.p. super-synchronous motors. These are exact duplicates of the motors driving the "compeb" mills in the raw department.

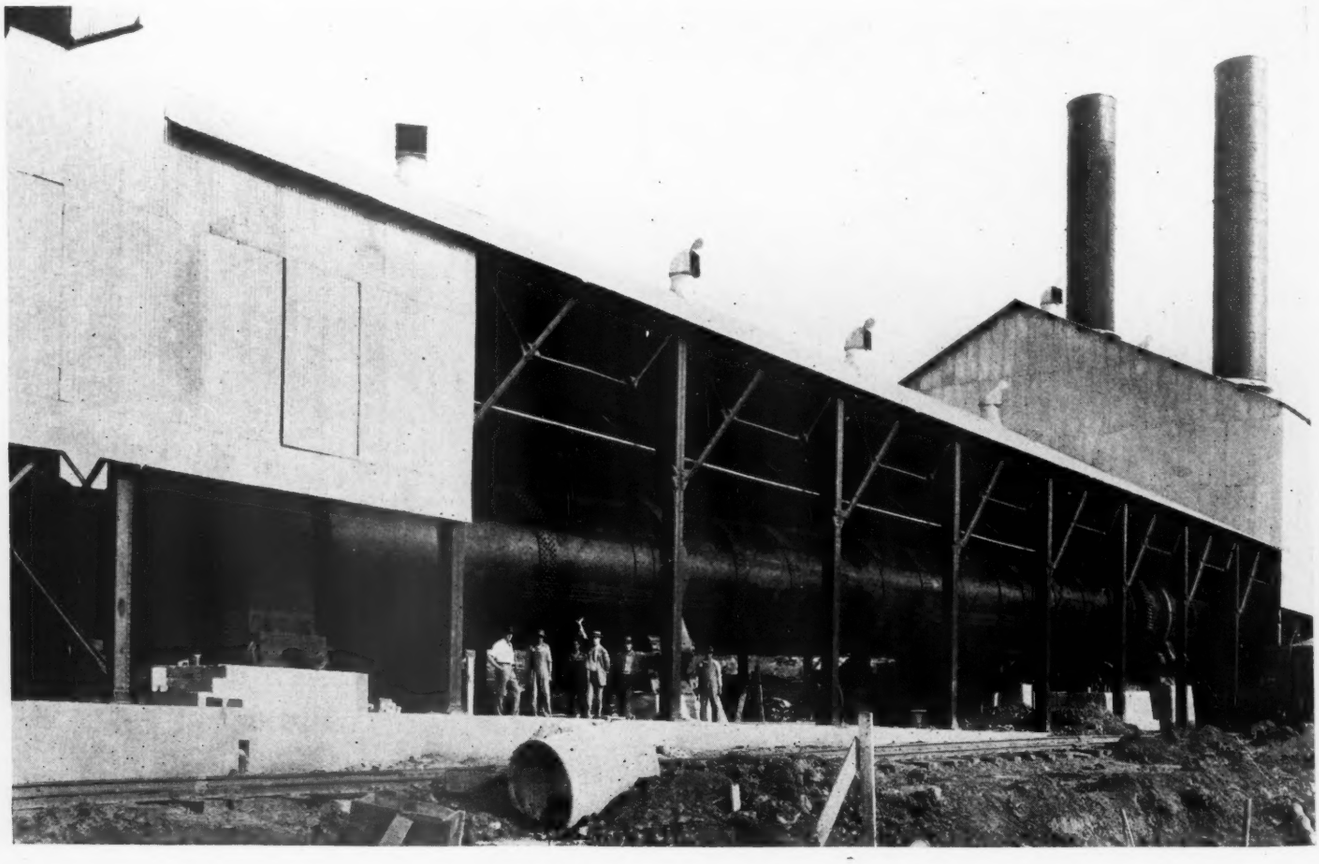
Cement Storage, Packing House, Bag House

The finished cement is discharged from the tube mills into an elevator which feeds a 16-in. screen conveyor. The conveyor carries the cement into the large storage bins or into the bins over the packing machines, as the case may require. There are eight large bins and three interstices or star bins having a total storage capacity of 90,000 bbl. of cement.

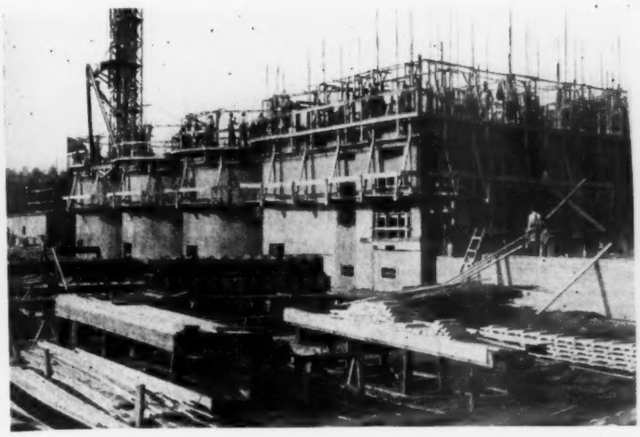
Cement is reclaimed by a system of conveyors and elevators terminating over and feeding four packing bins of concrete built integral with the packing house. These bins have a capacity of 300 bbl. each and feed the cement to Bates three-spout packing machines. The filled bags are carried to cars on 30-in. belt conveyors, loading being done on both sides of the building. The packing house has a capacity of 5000 bbl. in eight hours. A large bag house of concrete adjoins the packing house and has the usual equipment for receiving, cleaning and repairing bags returned to the mill.

Coal House and Coal Storage

Run of mine or slack coal is discharged from railroad cars into a standard 12-ft. track hopper. A reciprocating feeder passes the coal to a roll crusher which crushes the coal to 1-in. and down, if coal is sent to the mill. If the coal goes to storage the crusher is by-passed. An elevator serving the crusher raises the coal to a 24-in. belt conveyor so arranged that the coal may be carried to a bin over the drier or to storage, as required.

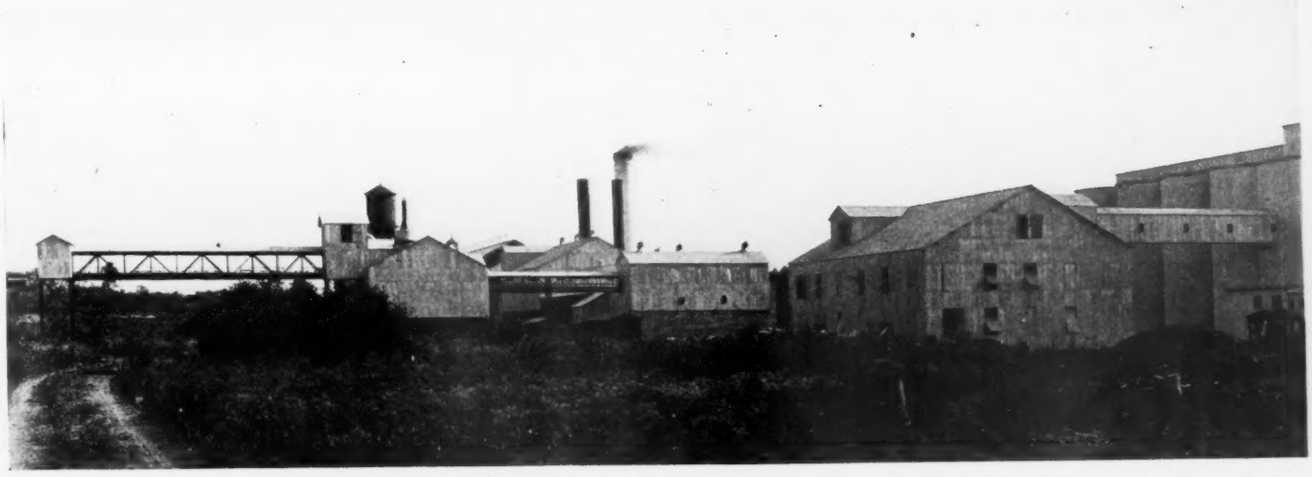


General view of the completed kiln building

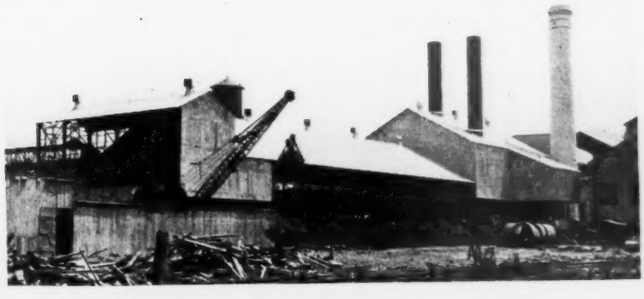


Construction view of packing house and cement storage silos

Completed packing house, bins, and hog house



General view of plant showing provision for coal storage—left—coal mill, kiln building, finish mill and stock house—right



Kiln building and waste-heat boiler house

Power house, left, store house and machine shop

View from south showing raw material storage

General view of finish end of mill

When coal is carried to the mill it is discharged into a steel bin holding 15 tons and having connected to its discharge opening a 14-in. poidometer. The poidometer serves as a feeder for the drier and also gives the tonnage of coal handled daily. A No. 10-class A Ruggles-Coles drier is used. The dried coal is raised by elevator into three 24-ton capacity steel bins over the pulverizers. Each bin serves a 5-roll Raymond mill having a capacity of 6 tons per hour. Each mill is direct-connected to a 60-h.p., 450 r.p.m. motor. Coal pulverized to a fineness of 96% through a 100-mesh sieve is carried to the kiln bins by means of a 12-in. screw conveyor driven through speed reducer and motor.

Waste Heat and Boiler Plant

Each kiln is connected at the receiving end with a Babcock and Wilcox waste-heat boiler having a rated capacity of 669 h.p. The boilers are connected with a common flue so arranged with dampers that either boiler or kiln may be operated alone. The kilns are also arranged with 8x70-ft. steel stack in order to provide for continuous operation of the kilns in case the boilers are down for repairs. The hot gases are drawn from the kilns, through the boilers and economizers and are finally discharged through a common steel breeching and concrete stack into the atmosphere. Up to the present time the gases leaving the kilns at 1050° F. are discharged at 375° F. thereby successfully furnishing enough steam to carry the entire mill load without forcing the kilns.

The boilers are equipped with Green economizers and fans, the latter being driven by 100-h.p. variable speed motors. The concrete stack is 12 ft. diameter by 125 ft. high and was built by the Heine Chimney Co.

The waste heat boiler plant also includes one hand fired boiler of the Stirling type with a capacity of 389 h.p. for use in starting the plant after a complete shut-down. All boilers are supplied with Copes feed water regulators.

Power Plant

This department is located a few feet west of the boiler house. It is equipped with two

Spray pond—cooling water system at the right

General Electric 1000-k.w., 2300-volt, 3-phase, 60-cycle, 3600-r.p.m. turbo-generators. Condensers and all power and boiler equipment except exciters are located in the basement. Condensers were built by the Worthington Pump and Machinery Corp. and have cooling surfaces of 2980 sq. ft. each. Vacuum and condensate pumps operating with them are motor driven with General Electric motors. The generators are supplied with surface air coolers. Circulating water for these may be supplied from the condensate pumps or from storage tank as may be required. The water so heated is used in the hot water heater.

Excitation for the entire plant is furnished either by a 75-k.w. turbo-driven exciter or a 875-k.w. dual driven set. In either case the exhaust from the turbines is piped to the Cochrane feed water heater and used for heating water for the boilers. In the case of the dual driven set the turbine stops and automatically starts the motor if the feed water gets too hot. There are duplicate motor driven centrifugal boiler feed pumps and one piston type steam driven boiler feed pump. There is also a steam driven tube washer pump for cleaning the condenser tubes.

Condenser water is supplied from pumps located approximately 1000 ft. distant. These pumps, two in number have a capacity of 3600 g.p.m. each and force water through a 30-in. concrete pipe. Water returns from the condenser through another 30-in. pipe to the cooling pond where it is cooled by means of spray nozzles. The pond has a capacity of 5,000,000 gal. Water for the boilers may be supplied either from the condenser discharge or from a 50,000-gal. service tank located on the east side of the plant.

The boilers were designed for 175-lb. steam pressures and 100 deg. superheat. Every precaution was taken to conserve heat wherever possible and to avoid condensation.

A 15x9½x12-in. direct-connected compressor of feather valve type driven by a 100-h.p., 227-r.p.m. synchronous motor is located in the power house basement and furnishes high pressure air for the mill.

The switchboard of black slate is located on the main floor of the power house and is provided with all the usual recording instruments. Meters giving the power used in each department as well as for the larger grinding units are used. All the switchboard mechanisms are located in a specially constructed chamber in the basement directly under the switchboard making the arrangement more convenient and safer. Current at 2300 volts is distributed to the various departments by means of underground cables. Current for motors under 40 h.p. is stepped down to 440 volts by means of transformers placed in convenient locations in each department. Motors 40 h.p. and over use current at 2200 volts.

A well equipped machine shop and store room 50x160 ft. located convenient to the power house completes the plant buildings. This building and the power house are of concrete and steel with expanded metal and stucco sides. The remaining buildings are of concrete and steel covered with copper hardened corrugated galvanized iron.

Standardization of machinery was considered carefully in designing the plant as were also the comfort and safety of employes. Ample space and light was provided throughout the plant and belts were almost entirely eliminated by the use of speed reducers direct-connected through motors.

An attractive building of hollow tile covered with stucco house the office and laboratory forces. In addition to the above the company has a group of cottages at Perry, Ga., seven miles away, for use for plant employes.

The principal contractors connected with the construction of the plant were the fol-

A sample of the company dwelling houses located on the Dixie Highway

lowing: Spencer Construction Co., all concrete construction, silos, packing house and bag house; Virginia Bridge & Iron Co., structural steel; General Electric Co., electrical equipment; Babcock and Wilcox Co., waste-heat boilers; Allis-Chalmers Co., kilns, crushers and grinding machinery; F. L. Smidth & Co., agitating machinery; Link-Belt Co., elevating and conveying machinery; Worthington Pump & Machinery Corp., condensers, pumps, etc.; Bradley Pulverizer Co., Hercules mills; Chattanooga Boiler & Tank Co., bins, tanks, etc.

The new plant may be termed a Clinchfield product, being designed by the operating and construction forces of the Clinchfield Portland Cement Corporation under the direction of Felix Guenther, Jr., general manager, with C. J. Lofstedt as designing engineer.

Personnel

John A. Miller, Nazareth, Penn., is president; James A. Blair, Jr., first vice-president; H. R. Dermis, vice-president; Warren P. Eaton, secretary; W. M. Bennett, Jr., treasurer and assistant secretary; Felix Guenther, Jr., general manager; M. M. Hunter, sales manager; Guy D. Pitts, assistant-treasurer and purchasing agent; E. P. Newhand, chief chemist.

The operating personnel of the new mill consists of C. C. Miller, superintendent; C. J. Lofstedt, operating engineer; N. V. Geyer, chemist.

New Cement Plant for Colorado

THE newly organized Midwest Portland Cement Co., holding nearly 1000 acres of raw material, including water rights, 21 miles west of Pueblo, Colo., on the Arkansas river and close to the two large cement works at Portland and Concrete, plans the construction of a plant to cost between $1,000,000 and $2,000,000, with a production of about 2,500 bbl. per day.

There is plenty of water for all purposes on the land and large water rights on the Arkansas river. The Santa Fe railroad has a branch on the property with a depot, and a 500-ft. spur leading to the factory site. The Rio Grande R. R. is on the opposite bank of the river. A good location for a town lies close to the mill site. A supply of coal is located within a few miles.

A 300-ft. drop leads from the shale deposit to the factory site, furnishing a factor in cutting the cost of production by taking advantage of gravity. Practically no overburden lies on the shale, and in many places it is fully exposed, while in others it carries only a few inches. The officers of the company are: R. J. Messier, president; Ben Gibson, vice-president; A. F. Takamine, secretary-treasurer; Robinson and Robinson, attorneys, and Hartley and Darman, engineers.—*Denver (Colo.) Rocky Mountain News.*

Ireland Brothers to Re-enter the Quarry Business

C. E. IRELAND, vice-president and general manager of the Birmingham Slag Co., has purchased an interest in the Ocala Lime Rock Co., of Ocala, Fla., and has become its new president. No change in his connection with the Birmingham Slag Co. has been made. Other officers of the slag company have purchased interests in the Ocala Lime Rock Co.

The Ocala Lime Rock Co., started in 1920, was a pioneer in the lime rock industry in Florida and has successfully grown until it is now one of the largest quarry operations in that part of the country. Many changes have been announced, among them plans for doubling the output of the company by enlarging operations and opening of new quarries.

The capital stock has been increased from $100,000 to $250,000. A new plant, to be known as plant No. 5, located about five miles south of Ocala, on the Seaboard railroad, has been started and is expected to be in operation within a short time. Other changes in personnel are:

C. E. Ireland, whose interests include crushed stone, sand, gravel and slag

C. G. Rose, the former secretary and treasurer of the company, becomes vice-president and general manager. W. N. Horne, for many years with the company, becomes secretary-treasurer. The new directors are: C. G. Rose, W. N. Horne, both of Ocala; C. E. Ireland and G. C. McCullough, of Birmingham, and C. B. Ireland, vice-president and general manager of the Montgomery Gravel Co., Montgomery, Ala.

The Irelands, father and sons, were originally in the quarry business in Ohio. They were formerly with the France Stone Co. of Toledo, and have many friends in the quarry industry.

Road Building in the United States During 1924

ACCORDING to statistics gathered by the Bureau of Public Roads, U. S. Department of Agriculture, more than 23,000 miles of road were built or surfaced in the state systems during 1924. The surfaced mileage constructed by types was as follows:

Sand-clay	1,385
Gravel	7,660
Waterbound macadam	467
Surface-treated macadam	1,000
Bituminous macadam	997
Sheet asphalt	120
Bituminous concrete	564
Cement concrete	4,850
Brick and other block pavements	164

The bureau estimates that at the end of 1923 there were surfaced roads in the state systems totaling 111,400 miles. Adding the mileage surfaced in 1924, after making allowance for the fact that a portion of the new work consisted of the resurfacing of old roads, it is indicated that approximately half of the 251,610 miles embraced in the state systems were surfaced at the beginning of the present year. These figures represent work done under state supervision, including Federal-aid work off the state systems. Progress in 1925 should be at least as great as in 1924, according to present information.

The following table shows the status of improvement in the various states:

States	Total mileage in system	Total mileage surfaced at end of 1923	Total mileage surfaced during 1924
Alabama	3,958.0	1,361.3	359.5
Arizona	1,891.6	1,252.6	221.6
Arkansas	6,414.8	2,348.0	1,316.0
California	6,400.0	2,924.0	509.9
Colorado	8,923.0	3,348.0	77.6
Connecticut	1,780.5	1,614.1	131.7
Delaware	350.5	350.5	67.3
Florida	3,508.5	1,901.8	274.9
Georgia	6,235.9	2,158.5	314.0
Idaho	4,071.3	1,292.8	235.9
Illinois	4,817.5	2,398.4	1,399.2
Indiana	3,818.8	3,611.6	508.5
Iowa	6,646.6	2,307.5	*897.7
Kansas	6,696.0	669.0	335.6
Kentucky	6,500.0	1,337.1	447.5
Louisiana	7,000.0	2,723.6	677.6
Maine	1,455.5	1,090.0	94.5
Maryland	2,095.5	2,095.5	151.7
Massachusetts	1,477.5	1,464.7	79.2
Michigan	6,581.7	5,501.7	813.9
Minnesota	6,973.8	5,279.1	842.1
Mississippi	5,400.0	2,163.8	273.1
Missouri	7,640.0	1,028.4	1,268.0
Montana	7,957.0	603.0	148.0
Nebraska	5,742.3	363.9	562.7
Nevada	2,704.3	381.8	323.7
New Hampshire	1,367.4	1,064.1	90.4
New Jersey	1,030.3	1,009.4	124.0
New Mexico	7,963.0	1,107.5	396.7
New York	11,260.0	8,931.3	574.8
North Carolina	6,100.1	4,374.1	1,074.2
North Dakota	4,860.0	509.0	358.3
Ohio	10,465.0	4,769.6	970.7
Oklahoma	5,556.0	1,047.0	331.5
Oregon	4,339.7	2,625.0	389.0
Pennsylvania	†10,718.3	6,305.5	1,179.3
Rhode Island	761.6	387.2	32.2
South Carolina	4,015.3	2,283.4	511.0
South Dakota	5,541.8	1,127.7	814.9
Tennessee	4,618.0	2,359.7	445.5
Texas	16,668.0	6,532.1	862.0
Utah	3,132.3	817.3	175.9
Vermont	4,453.0	2,731.7	194.9
Virginia	4,399.5	2,174.0	341.7
Washington	3,075.6	2,173.2	396.8
West Virginia	3,532.0	710.1	505.9
Wisconsin	7,523.7	5,749.5	567.0
Wyoming	3,189.7	500.0	495.9
Totals	251,610.9	111,399.9	23,164.0

*State trunk roads only.
†Includes State-aid system.

Hints and Helps for Superintendents

Launder of Waste Materials

By H. L. Aldrich

Ass't Superintendent, P. Koenig Coal Co.'s Gravel Plant, Oxford, Mich.

FOR the Helps and Hints columns I submit the idea below that may be old elsewhere but new to us at this plant.

We found it necessary a short time ago to provide a return flume for a quantity of water carrying sand and silt. We had constructed a pebble washer over our head pulley on the loading conveyor, using an open flattened pipe discharging on the pebbles as they passed over a perforated screen. The screen passed the water and dirt through into a box and from there we had to flume it away.

The flume had to be about forty feet in the air at the intake and we were bothered about building it at that height without quite an expense. It happened that we had on hand a quantity of welded eight inch pipe in 30-ft. lengths with flanges. This pipe was surplus and doing no one any good by lying in a pile so we conceived the idea of using it for a return flume.

We did this by raising two single tamarack poles, of the required height, to each length of pipe. Each pole had a short cross arm bolted in place to carry the pipe and a piece of messinger wire for tying in. On the box end we cut a round hole and bolted the flange to it.

This job was quickly and easily constructed and works perfectly. The expense was much less than if an ordinary flume had been constructed and it provided a use for pipe that was otherwise "excess baggage."

A launder for waste sand and silt easily and cheaply erected

Swinging Chute for Loading Cars

SEVERAL arrangements of swinging chutes have been shown from time to time among these "Hints and Helps." That which is shown in the picture is not so novel but it is such a neat and simple device that it is worth a place in these pages.

The material to be loaded is brought by a conveyor which runs in a tunnel under ground bins, or stockpiles. The conveyor discharges into a box and the swinging chute (which is of steel) is attached so that it receives the discharge through a hole in the bottom of the box in all positions.

The chute is suspended from a crane-arm that is attached to a post at one side by a rope that passes through blocks so that it can be raised and lowered to any height. It is swung by a rope handled by the man who has charge of loading the cars. He is shown inside the car but he can handle it just as well from a point outside the car.

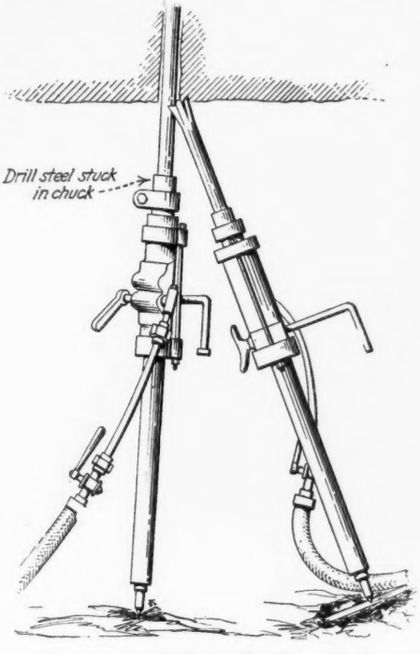
This device is in use at the plant of the Detroit-Oxford Gravel and Stone Co., Oxford, Mich.

Swinging chute for loading cars

Removal of Drill Steel from Chucks

By IRA LIMMEN

WHEN a steel drill has become rigidly stuck in the chuck of a stoper drill, the stoper is usually, as a last resort, sent to the blacksmith shop. A more direct method is as follows: Another stoper from a nearby working is obtained and a short steel starter is inserted in the chuck. The second stoper is placed in position, and the starter forced against the stuck drill steel at the collar of the hole. This secures the first machine in



Loosening drill steel when stuck in chuck

position and allows its weight to hang upon the steel. The air is then turned on, and the blows of the hammer quickly release the stuck steel.—*Engineering and Mining Journal-Press.*

[This will especially interest those who work in limestone mines where overhand stoping is the practice.—Ed.]

Cleaning Screen for Loading Washed Stone

CLEANING screens are often used for loading gravel. This, which is shown in the picture, is a little unusual because it is used for loading washed stone. It is also a neat and light-weight arrangement.

The chute which comes from the washing plant above is of steel plate and is hung by a bail which is attached to a rope which is not shown. Just above the bail is a section that contains a screen over which the material flows on the way to the car. The fines go through on the bottom of the chute and run until they meet a baffle placed under the screen and in front of the pipe shown. So the fines go out of the pipe and the coarse goes to the car. The pipe is jointed by a rubber connection which allows it to be swung from side to side.

In this case the device is to insure cleanliness of product rather than to insure good sizing. The washed stone is chemical limestone and must be quite free from clay. If any clay escapes the washer it will go with the fines and the fines, which are in very small quantity, may be discarded or rewashed. If there is no clay with the fines, which is almost always the case, the fines are shovelled on the car to be shipped with the coarse. This device is in use at the Valmeyer plant of the Columbia Quarry Co. of St. Louis, Mo.

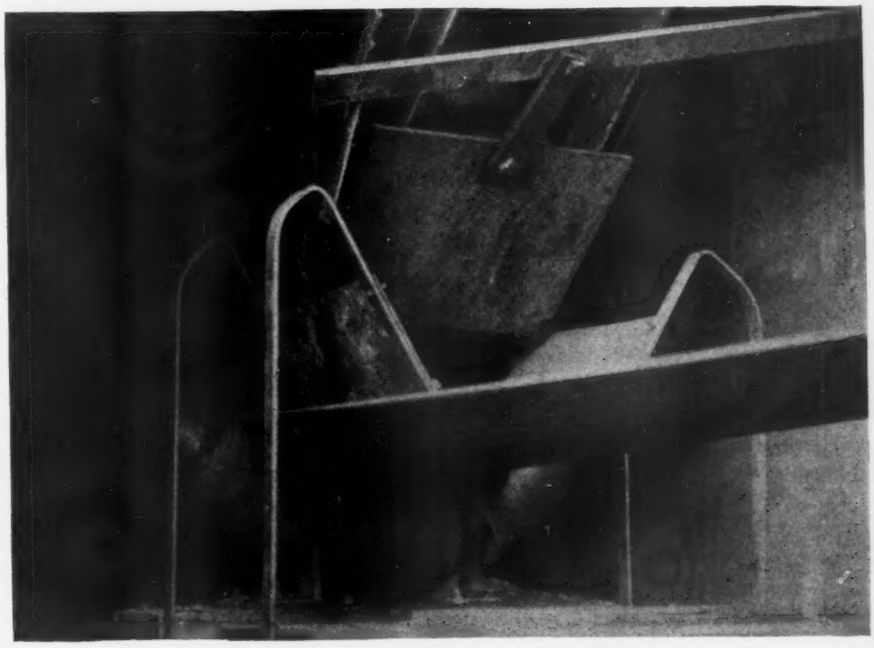
Cleaning screen for loading washed sand for shipment

Gate and Skirt Boards for Conveyor Belt

AN excellent arrangement for delivering from a bin to a belt conveyor is shown in the accompanying picture. The spout from the bin is at 45 deg. and the inclination is in the direction of the belt travel. The end of the spout is closed by a sliding plate controlled by a lever and skirt boards keep the material from rolling off the edge of the belt. The arrangement is equally good for crushed stone and gravel plants.

The flat plate which closed the spout is attached to four hangers on the ends of which are rollers like those used on a barn door. One of them shows quite plainly below the figure 5 which is painted on the spout. These rollers rest on angle irons bolted to the sides of the spout which serve as tracks. They are carried a considerable distance beyond the spout to allow the spout to be fully opened.

The flat plate is moved by a lever which shows in part in the picture. The bolt on which it turns is just outside of the picture and to the right. Pulling the lever down opens the spout.



Gate and skirt boards for conveyor belt

To allow the plate to be set to any opening desired there is a notched bar, which shows at the left of the spout and a spring catch on the end of the lever. This holds the gate in any position.

The skirt boards at the side of the spout are hung on bent supports of 1 x ¼-in. steel. They can be lifted easily and will return to the same position after being released. If a stone catches under the edge of one of them it is not held to tear the belt, as very often happens with a fixed skirt board. The spring hangers allow the skirt board to lift and the stone rolls out and goes on up the belt without doing any damage.

This arrangement is in use at the J. C. Stewart plant at Oxford, Mich.

SEVERAL plant superintendents are receiving $5 checks for Hints and Helps. Surely every superintendent has some kink he has worked out. If you have got any good suggestions from the other fellow, why not let him have yours?

Financial News and Comment

Pacific Portland Cement Company Notes Offered

THE Mercantile Securities Co. of California are offering at 100 and interest $2,000,000 6% secured serial gold notes.

Dated April 15, 1925; due serially April, 1928, to 1937. Interest payable A. & O. without deduction for normal federal income tax up to 2% at Mercantile Trust Co. of California, San Francisco, trustee. Denomination, $1000 and $500. Callable on 60 days' notice on or before April 15, 1927, at 103; thereafter redemption premium shall be reduced ¼% for each succeeding year or fraction thereof. Exempt from personal property taxes in California.

Data from letter of President Robert B. Henderson, San Francisco, March 28, are as follows:

History and Business—Pacific Portland Cement Co. was originally incorporated in California in 1901. In 1905 its rapidly increasing business demanded additional capital and the Pacific Portland Cement Co., Consolidated, was incorporated, acquiring the assets of the old company. Today it operates two cement mills with a daily capacity of 7000 bbl. and two plaster mills with a daily capacity of 800 tons.

Security—Secured by a first mortgage lien upon the company's new Redwood City plant, recently constructed at a cost of approximately $3,000,000. This mill has a capacity of 2750 bbl. per day, and raw materials adjacent with direct land and sea shipping facilities. Company's other plants, valued at approximately $9,000,000, are located as follows: Cement plant at Cement, Solano county, California; limestone quarries near Auburn, El Dorado county, California; plaster mill near Gerlach, Nev.; plaster mill in Imperial Valley, California. Company also owns quarries and other raw material reserves in Amador, Placer, Tulare and Kern counties, California, and Clark County, Nevada. Company will covenant in the trust indenture securing these notes not to mortgage any of the properties not specifically pledged under the issue unless these notes participate equally in the mortgage lien.

Earnings—Company's average annual earnings since January 1, 1920 (calculated after yearly provision for depreciation and depletion but before federal income tax), available for interest, amount to $1,013,000, or 8.4 times maximum interest requirements on this issue.

Purpose—Proceeds will be used to retire indebtedness incurred in connection with the company's recent extensive construction program and to increase its working capital.

CONSOLIDATED BALANCE SHEET DECEMBER 31, 1924 (After This Financing)

Assets—	
Real estate, plants, etc.	$11,810,383
Cash	853,337
Inventories	952,051
Accounts and notes receivable	645,125
Deferred Charges	70,867
Total	$14,331,763
Liabilities—	
Capital stock	$10,000,000
Bonded indebtedness	2,000,000
Accounts payable	366,277
Accrued pay-roll	79,919
Sundry reserve	403,773
Surplus	1,481,793
Total	$14,331,763

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	Sept. 14	100	133	133	1¾% quar. Sept. 1
Alpha Portland Cement Co. (preferred)**	Sept. 11	100	108	.....	1½% quar. Sept. 1
Arundel Corporation (sand and gravel—new stock)	Sept. 16	No par	34⅞	35	30c quar. Sept. 1
Atlas Portland Cement Co. (common)	Sept. 14	No par	54	54¾	50c quar.
Atlas Portland Cement Co. (preferred)**	Sept. 11	33⅓	45	48	2% quar. July 1
Bessemer Limestone and Cement Co. (common)‡	Sept. 10	100	135	145	1½% quar. Oct. 1
Bessemer Limestone and Cement Co. (preferred)‡	Sept. 10	100	106½	108	1¾% quar. Oct. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	Sept. 10	.....	127½	130	8% annual
Boston Sand and Gravel Co. (common)	Aug. 29	100	70	70	2% quar. July 1
Boston Sand and Gravel Co. (preferred)	.....	.....	.....	.....	1¾% quar. July 1
Boston Sand and Gravel Co. (1st preferred)	.....	.....	.....	.....	2% quar. July 1
Canada Cement Co., Ltd. (common)	Sept. 16	100	105¾	106½	1½% quar. July 16
Canada Cement Co. Ltd. (preferred)	Aug. 4	100	78	78½	1¾% quar. Aug. 15
Canada Cement Co., Ltd. (serial bonds)	June 30	.....	102½	.....	3% semi-annual
Charles Warner Co. (lime, crushed stone, sand and gravel)	Sept. 12	No par	23	26	50c quar. July 10
Charles Warner Co. (preferred)	Sept. 12	100	98	102	1¾% quar. July 23
Dolese and Shepard (crushed stone) (a)	Sept. 16	100	53	55	1½% quar.
Giant Portland Cement Co. (common)**	Sept. 11	50	32	35	
Giant Portland Cement Co. (preferred)**	Sept. 11	50	53	56	3½% semi-ann. June 15
Ideal Cement Co. (common)‖	Sept. 16	No par	65	75	$1 quar. June 30
Ideal Cement Co. (preferred)‖	Sept. 11	100	105	107	1¾% quar. June 30
International Cement Corporation (common)	Sept. 16	No par	69	70	$1 quar. Sept. 30
International Cement Corporation (preferred)**	Sept. 11	100	104	105	1¾% quar. Sept. 30
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Kelley Island Lime and Transport Co.	Sept. 15	100	109½	110	2% quar. July 1
Lawrence Portland Cement Co.**	Sept. 11	100	110	.....	2% quar.
Lehigh Portland Cement Co.‖	Sept. 11	50	89	91	1½% quar.
Michigan Limestone and Chemical Co. (common)‖	Sept. 11	.....	23	.....	
Michigan Limestone and Chemical Co. (preferred)‖	Sept. 11	.....	23	.....	1¾% quar. July 15
Missouri Portland Cement Co.	Sept. 16	25	73¾	74¼	25c quar. Aug. 1; 25c ex. Aug. 1.
Missouri Portland Cement Co. (serial bonds)	May 29	.....	104½	104½	3¼% semi-annual
Monolith Portland Cement (common)	Sept. 13	.....	.....	7½	
Monolith Portland Cement (units)	Aug. 13	.....	21	23	
Monolith Portland Cement (preferred)	Aug. 13	.....	6½	7	
North American Cement Corp. 6½s 1940 (with warrants)	Aug. 29	.....	98⅝	98¾	
Pacific Portland Cement Co., Consolidated (b)	Sept. 13	100	81¼	82	
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	Sept. 10	.....	99¾	101	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Sept. 10	10	7¾	8⅛	
Petoskey Portland Cement Co.*	Sept. 10	10	9½	10½	1½% quar.
Pittsfield Lime and Stone Co. (preferred)	.....	100	.....	.....	2% quar. Apr. 1
Rockland and Rockport Lime Corp. (1st preferred)	Sept. 1	100	a	.....	3½% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (2nd preferred)	Sept. 1	100	70	.....	3% semi-annual Aug. 1
Rockland and Rockport Lime Corp. (common)	Sept. 1	No par	70	.....	1½% quar. Aug. 1
Sandusky Cement Co. (common)*	Sept. 15	100	105	106	2% quar. July 1
Santa Cruz Portland Cement Co. (bonds) (b)	Sept. 13	.....	104¼	110	6% annual
Santa Cruz Portland Cement Co. (common) (b)	Sept. 13	50	67	68	$1 Apr. 1
Superior Portland Cement Co.	Mar. 1	100	.....	120	
United States Gypsum Co. (common)	Sept. 16	20	202	203½	2% quar. Sept. 30; $1 ex. Sept. 15
United States Gypsum Co. (preferred)	Sept. 14	100	117½	117½	1¾% quar. Sept. 30
Universal Gypsum Co. (common)†	Sept. 16	No par	21	23	
Universal Gypsum V. T. C.†	Sept. 16	No par	20	22	
Universal Gypsum Co. (preferred)†	Aug. 5	.....	76	.....	1¾% quar. Sept. 15
Universal Gypsum Co. (1st mortgage 7% bonds)†	Sept. 16	.....	99	(at 6½%)	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wolverine Portland Cement Co.	Sept. 16	10	10½	11½	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Bauer, New York.
†Quotations by True, Webber & Co., Chicago. ‡Quotations by The Valley Investment Co., Youngstown, Ohio.
§Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York.
(a) Quotations by F. M. Zeiler & Co., Chicago, Ill. (b) De Fremery and Co., San Francisco, Calif.

Editorial Comment

Our Price Quotations

Our current price quotations are primarily for the benefit of the *producers* of the commodities quoted. They are intended to keep these producers posted as to the actual prices at which these materials are moving, and not what producers would like to get nor what producers would like to have others believe they are getting. Nothing is gained by anyone in making fake quotations. We believe most of the quotations in ROCK PRODUCTS are *bona fide* prices at which the commodities are moving; corrections, criticisms and suggestions are earnestly desired.

Fight Freight Rate Increases!

Producers of sand, gravel and crushed stone are just as anxious to see the railways prosper as any other group of business men and citizens—probably more so, because they come often in direct contact with railway company purchasing agents, and they have a direct interest in a well-filled railway company treasury. There are indeed some stone, gravel and sand producers who feel such genuine sympathy for the railways that they have already generously accepted as inevitable the proposed 7½c. per ton increase in freight rates on these commodities in western territory.

Granted that *all* freight rates should be increased to help the railways, *an exception* of the rates on sand, gravel and stone is fully justified. There is no other commodity so cheaply manufactured almost anywhere as are these. Any increase in the freight burden, which is today considerably in excess of the f.o.b. plant value of these commodities, simply means the elimination of so much possible freight for the railways to haul.

Nor are the rates on sand, gravel and stone relatively low as compared with other commodities. Time and again they have been proved relatively high. And the revenue produced is far from being an insignificant factor to the railways. In 1924 it amounted to not less than $100,000,000.

Every producer has himself experienced *and knows* that every increase in freight rates increases the number of side-of-the-road plants with truck-haul deliveries, which take his business away from him. Every increase in freight rates increases the range of motor-truck haul from his own plant. He knows that the railways lose more revenue through loss of volume in freight of this kind than they get back by the increase in the rate on what they do haul. Why not find some feasible way to make the Interstate Commerce Commission and the railways see their problem of increasing railway revenue from this angle?

You producers have invested thousands of dollars and untold effort and energy in publicity and promotional work in favor of the use of screened, washed, or properly prepared, concrete aggregates. Are you going to allow all this to be nullified by a senseless and unjustifiable increase in freight rates? There is no need of it. You have well organized National Associations to help you. We respectfully suggest you get busy and take a little more interest in developments which are bound to affect you vitally.

Industries Founded on Rock

The biblical proverb of the wise man who founded his house upon a rock, and the foolish one who didn't may have a parallel in business. There is good reason to believe that well-managed rock products enterprises are founded on firm economic ground from the very reason that they are founded on the rocks of Mother Earth (we include sand and gravel, of course, in the general term "rock products"). It is hard to imagine that any substitute will replace these rock products, or that they will ever lose popularity as long as civilization lasts and mankind progresses.

The same is not true of some other industries. In a paper, "The Handwriting on the Wall,"* Arthur D. Little, consulting chemist, Boston, Mass., gave some interesting and significant facts. He said: "The Victor Talking Machine Co. had a business so highly profitable and so well organized that dividends on its common stock averaged more than $42 a share for eleven years, to which in 1922, was added a 600% stock dividend. Meanwhile, research has developed radio and the Victor Talking Machine Co. has passed its dividend."

He says further: "American manufacturers must be made to understand that we are in the midst of an industrial revolution, in the course of which many established businesses will find their balance sheets deeply dyed with red unless those charged with the responsibility of management can learn to direct their course in the flood of new knowledge pouring from the laboratories. To those with vision science is bringing countless new opportunities for constructive and profitable effort."

It is difficult to see how the fate of the Victor Talking Machine Co. can overtake rock products businesses, although probably all will feel that if they could make as much money in that length of time they would be willing to scrap their plants. Nevertheless, because they are founded on the rock of basic, economic importance, these industries cannot afford to neglect the amount of progress that is possible through research work; but such research work, fortunately, is more necessary to extend the uses of rock products, than it is to hold the business now in hand.

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*Read before the American Institute of Chemical Engineers at Providence, R. I., recently.

Traffic and Transportation

By EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning September 14:

Southern Freight Association Docket

22624. Sand, C.L., min. wt. 90% of marked capacity of car except when cars are loaded to their visible capacity the actual weight will govern, from White Oak, Tenn., to Mayfield, Ky. Present rate, $1.70 per ton (Jackson, Tenn., combination); proposed, $1.31 per net ton based on the proposed Georgia-Alabama scale, less 10% for the actual distance.

22658. Stone, rubble, crushed or broken. C.L., min. wt. capacity of car, but not less than 60,000 lb., from Moretti, Ala., to Mobile, Ala. Present rate, $1.90 per net ton; proposed, $1.69 per net ton, same as rate to New Orleans, La.

22663. Lime. C.L., min. wt. 30,000 lb., from Bruns, Sherwood, Summitville, Tenn., and Cumberland, Ala., to Frankfort and Cincinnati railway local stations, Summit, Ky., to Elizabeth, Ky., inclusive, and Georgetown, Ky. Present rate, $3.94; proposed, $3.50 per net ton. The proposed rate from Sherwood, Cumberland and Summitville represents the Fourth Section Committee or Southern Carriers' proposed rate.

22675. Ground Limestone. C.L., min. wt. 60,000 lb., from Whitestone, Ga., and Cartersville to destinations in the states of Alabama, Tennessee and Kentucky, to the extent commodity rates are in effect on powdered whitestone from Whitestone, Ga., to Alabama points in question they do not reflect the basis generally observed in making rates from Whitestone to points on the L. & N. railroad in Alabama. This traffic is handled via Cartersville S. A. I. railway to Wellington, Ala., thence L. & N. railroad to destinations, and the proper basis for making the rates is to employ factors from Whitestone and Cartersville and from Wellington to destination, made on the same basis used in making rates between other points on the L. & N. for similar distances to which is added a proportion of 80c per net ton required by the S.A.L. railway for the haul from Cartersville to Wellington. It is proposed to revise the rates from Whitestone, Ga., to the points to which commodity rates are published to reflect the basis outlined above, and also to establish commodity rates on the same basis to points to which Class N rates now apply. Where commodity rates are now published on "Powdered whitestone" from Whitestone, Ga., to the destinations involved, it is proposed to change the commodity description to read "Ground Limestone," as the term "Powdered Whitestone" is really only a trade name and the article shipped from Whitestone is nothing more or less than ground limestone.

22684. Slate, crushed, ground or scrap. C.L., minimum weight 90% of the marked capacity of car, from Granville, N. Y., and Poultney, Vt., to Memphis, Tenn. Present rate 61 cents per 100 lb. (Class A); proposed, $8.74 per net ton, same as rate now in effect frim Poultney, Vt., to New Orleans, La., and Mobile, Ala., on crushed or ground slate.

22690. Lime, sulphate of. C.L., min. wt. 30,000 lb. from Nashville, Tenn., to south Atlantic ports, wharf portals (for export). Present rate 63 cents per 100 lb. (6th class); proposed,, 39 cents per 100 lb. same as rate proposed in Submittal No. 22277 to Gulf ports.

22725. Granite or stone, viz.: curbing, crossing, flagging or paving blocks. C.L., min. wt., 40,000 lb. Granite or stone, rough, quarried or sawed or hammered, chiseled, sand rubber or slushed. C.L., min. wt. 40,000 lb., from Berkeley, Elberton, Ethridge and Oglesby, Ga., to Youngstown, Ohio. Present rate, $5.53; proposed, $4.81 per net ton, made not higher than current rate to Akron, Canton and Cleveland, Ohio.

22726. Gravel, C.L.; slag, C.L.; crushed stone, C.L.; min. wt. 90% of marked capacity of car, except when cars are loaded to visible capacity, actual weight will govern; from Jacksonville (when from beyond), Fla., to stations named below. It is proposed to revise rates to stations on the Tampa and Gulf Coast railroad, Tampa Northern railroad and Seaboard Air Line railway, intermediate to St. Petersburg, Tarpon Springs and Drexel, Fla., so as not to exceed published rates to those points which are: On gravel and crushed stone, C.L., $1.54 per net ton and on slag, C.L., $1.42 per net ton.

New England Freight Association Docket

8823. Lime. Min. wt. 40,000 lb., from Cheshire, Farnams, North Adams, Renfrew, Richmond and Zylonite, Mass., to Philadelphia, Pa., and all points taking Philadelphia rates basis on the C. R. R. of N. J. (west of Somerville, N. J.), Penn. railroad and Reading Co. (south and west of Trenton, N. J.), 22½. Reason: To place lime producers on the B. & A. railroad on a parity with lime shipping stations in Massachusetts on the N. Y. N. H. & H. railroad.

Trunk Line Association Docket

12727. To cancel commodity rate of 75 cents per net ton rock sand, unpulverized, from Mapleton, Pa., to Granville, Pa., account being obsolete. File 17437.

12734. To establish mileage scale of rates on limestone, unburnt, ground or pulverized, C.L., min. wt. 50,000 lb., between all stations on the B. & O. railroad in West Virginia, rates ranging 10 miles and under 80 cents per ton up to 280 miles but not over 290, $12.71 per net ton.

Central Freight Association Docket

11554. Gravel and sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding, polishing, loam, moulding or silica). Evansville, Ind., to Parker, Ill., and Cairo, Ill. Present rate 6th class; proposed, $1.13 per net ton to Parker, Ill., and $1.26 per net ton to Cairo, Ill.

11555. Gravel and sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding, polishing, loam, molding or silica). Ft. Jefferson, Ohio, to Briceton, Ohio. Present rate, 90 cents per net ton; proposed, 80 cents per net ton.

11556. Ex-lake molding sand. Dunkirk, N. Y., to Corry, Pa. Present rate, $1.39 per net ton; proposed, $1.05 per net ton.

11559. Gravel and sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding, polishing, loam, molding or silica). Rush Run, Ohio, to Cincinnati, Ohio. Present rate, 23½ cents; proposed, $1.80 per net ton.

11560. Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, molding or silica) and gravel. Dune Park, Ind., to Toledo, Ohio. Present rate, $1.73 per net ton; proposed, $1.25 per net ton.

11561. Stone, rip rap and rubble. Neshannock Falls, Pa., to Auburn, Ind. Present rate, 22½ cents; proposed, $3.15 per ton of 2000 lb.

11566. Gravel and sand (other than blast, core, engine, foundry, glass, molding or silica). Attica, Ind., to Ft. Wayne, Ind. Present rate, $1.01 per net ton; proposed rate, 88 cents per net ton.

11573. Sand (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, molding or silica) and gravel. Cement City, Mich., to Maumee, Ohio. Present rate, $1.12 per net ton; proposed, $1.04 per net ton.

Illinois Freight Association Docket

3339. Stone, crushed coated with oil, tar or asphaltum (known as amesite or carbo rock). Min. wt. 90% of marked capacity of car, except when loaded to full cubical or visible capacity actual weight will apply. Proposed to establish the following mileage scale of rates from Chicago, Ill., to pints in Illinois, i.e.:

Distance	Cents per net ton
10 miles and under	96
40 miles and over 25 miles	107
75 miles and over 60 miles	130
150 miles and over 125 miles	176
200 miles and over 175 miles	199
250 miles and over 225 miles	222
300 miles and over 275 miles	257
400 miles and over 375 miles	303

Southwestern Freight Bureau Docket

5929. Sand. From Pacific and Grays Summit, Mo., to Houston, Texas. To establish a rate of 21½ cents per 100 lb. on sand, C.L., min. wt. 80,000 lb. unless marked capacity of car is less, in which case marked capacity of car will govern, from Pacific and Grays Summit, Mo., to Houston, Texas. Shippers advise they cannot place any sand in Houston on basis of class rates.

5940. Sand. From Guion, Ark., to Wichita Falls, Texas. To establish a rate of 17½ cents per 100 lb. on sand, C.L., min. wt. 80,000 lb. unless marked capacity of car is less, in which case marked capacity will govern, from Guion, Ark., to Wichita Falls, Texas. Proponent advises that he is unable to place any sand in Wichita Falls on basis of class rates.

Gravel and Stone Men Watch Developments in Western Rate Case

A GROUP of interested sand and gravel producers met in Chicago on September 8, under the auspices of the National Sand and Gravel Association, to consider what action should be taken in the matter of the 7½c. per ton increase in freight rates on sand, gravel and crushed stone in western territory. President John Prince of Kansas City, Mo., presided and T. R. Barrows, secretary, Washington, D. C., was present.

An organization of western producers was perfected with a finance committee composed of the following: J. L. Shiely (chairman), St. Paul, Minn.; J. A. Coffey, St. Louis, Mo.; George A. Rogers, Los Angeles, Calif.; F. W. Erlin and Robert J. Potts, Dallas, Tex.

It is evidently believed that the move of the western carriers for a 5% increase (with flat increases on some commodities) is largely a political move to head off any further reductions on agricultural commodities under the Hock-Smith resolution. The Interstate Commerce Commission hearings at Chicago thus far have had to do with railway testimony only, but shippers organizations in all commodities are closely following results.

The National Crushed Stone Association, acting through Col. O. P. Chamberlain, member of the executive committee, Chicago, has employed John Kane, a traffic expert of Chicago, formerly traffic manager of the Illinois Commerce Commission, to oppose the proposed advance in rates.

Producers in the territory affected (everything west of Chicago) evidently are not as much alive to the situation as they should be. It means an additional tax on sand, gravel and stone of about $8,000,000 a year, if the proposed 7½c. increase is extended to all the other railway freight territories, and that it will be, if the western case is successful, seems to be the general impression.

Railroads Ask Slight Cut in Sand and Gravel Rates in Kansas

PERMISSION to publish a rate of four cents per 100 lb. on sand, gravel and crushed rock from Morris to Overland Park and Goodman is asked by the Santa Fe and Missouri & Kansas railroads in a joint application filed with the public service commission. The proposed rate is a slight reduction from the existing rate.—*Topeka (Kan.) Journal.*

Cement Products

A 15,000-Block-a-Day Plant Near Philadelphia

Slag and Cinders are Aggregates Used

THE PLANT of the Ellis Concrete Products Co., which is at Henderson Station, a short distance out of Bridgeport, Penn., is admitted to be one of the best plants in the vicinity of Philadelphia. It is also the plant having the largest output in that section for it produces 15,000 block per day (24 hr.). This output is said to be exceeded by only one plant in Pennsylvania.

Three block machines are employed, an Anchor stripper, a Besser semi-automatic and a Besser automatic. These machines are fed from Besser mixers with the usual arrangements for conveying the mixed concrete to the hoppers of the machines. The Anchor stripper has been quite recently installed.

As is usual with the plants of this district the aggregate mainly employed is slag. Cinders are also used and both these are mixed with a little sand which is obtained from a local pit. This sand, although unwashed, appears to be very clean and of a highly silicious nature.

The design of the plant is simple and it is unusual in that there are 20 overhead bins for aggregate. The aggregate is received at the plant in either railroad cars or trucks and wheeled into the mixer house. In making up the batches, sand and slag (or cinders) are shoveled into a traveling bucket that moves on a monorail. The bucket is dumped into the mixer. The arrangement seems to work well, but it was stated that in an addition to the plant which was contemplated, overhead bins will be included.

Concrete fence posts are made at this plant and additional machinery for making these was being installed at the time the plant was visited. The fence posts are poured and not pressed and the machinery for making them includes a ½-yd. mixer driven by a gasoline engine and arrangements for handling the moulds.

The blocks are handled from the machines through the curing rooms in the usual way; that is, by being placed on trucks and run into the kilns and then placed at any point in the yard by parallel tracks and a transfer truck. At present very few blocks are stacked in the yard. The demand for them is so great that they are taken after the steam curing and loaded into trucks and delivered at once to the job. Provided that the blocks are properly made and have the necessary strength there seems to be no objection to this practice, which the writer saw employed in more than one plant in the vicinity of Philadelphia.

Delivery is made easier than in many plants by having the storage yard and tracks above the level of the highway. Cars loaded with block may be pushed down to the highway and put on the motor truck which is to deliver them with the minimum of lifting.

Everything about this plant is neat and well kept, and the work proceeds in an orderly way, as it should with such a permanent manufacturing enterprise. It

An Opportunity for Publicity

NATIONAL Fire Prevention Week will be observed this year from October 4 to October 10.

October 9, 1925, is the 54th anniversity of the fire which in 1871 destroyed the city of Chicago. The aim of fire prevention week is to bring to the people a realization of two fundamental facts: that the fire loss is everybody's loss and everybody's responsibility and that the great majority of fires are preventable through the employment of fire-resisting materials.

Concrete masonry construction affords the use of fire-resisting materials at low cost. Concrete products manufacturers should take advantage of special publicity possibilities during fire-prevention week.

Rear view of Ellis Concrete Products Co. plant near Bridgeport, Penn.

is in a locality where concrete blocks are appreciated and the two towns, Bridgeport and Norristown, which are separated only by a river, furnish a nearby market.

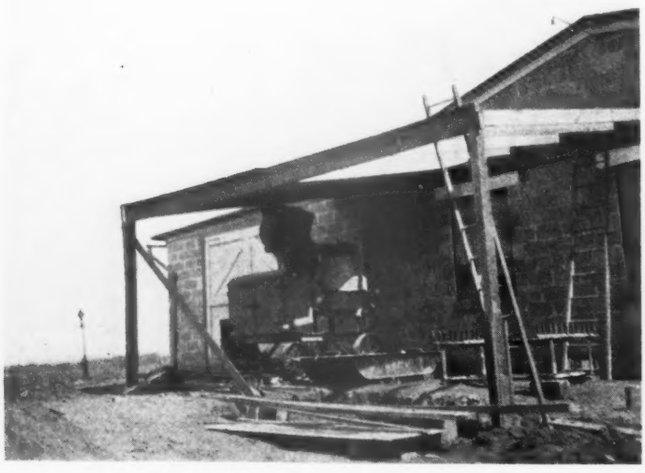
The principal owner of the business is William H. Ellis. The plant was built two years ago, but several additions have been made to the original equipment and more are contemplated.

sippi. The incorporators and owners are: T. W. Townsend, president; Allen B. Puckett, vice-president and secretary; Ira L. Gaston, treasurer. The capital stock is $50,000.

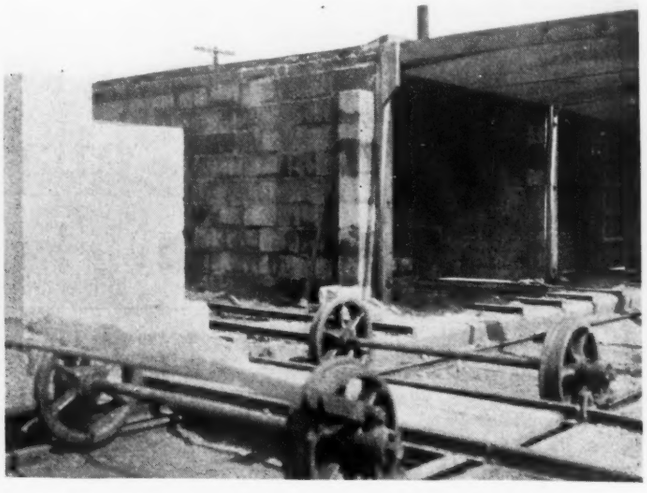
D. E. Barnett and Co. of Memphis, Tenn., are in charge of operation, the work being under the direct supervision of Mr. Barnett. —*Columbus (Miss.) Dispatch.*

port Gravel Corporation's pit at Deep Bottom, a part of Curles Neck Farm on the James river, to Tampa, where it will be used in road construction and development of new territory adjacent to Tampa.

The Bull Line, steamship operators of New York, has been chartered by the Ocean Stone and Gravel Co. to move the gravel. Under terms of the contract, six vessels a



Addition to plant where fence posts are to be made under construction



Curing "kilns," tracks and transfer trucks used to move the blocks from machines

A truck load of blocks, warm and steaming ready to be loaded for delivery

Loading platform for trucks—an helpful but often overlooked detail

Concrete Gravel Company Begins Operation

THE Concrete Gravel Co.'s plant at Columbus, Miss., was recently put in operation. It is said to be one of the most modern gravel plants of the South.

The pits are located seven miles northeast of Columbus on the Southern railway. Large deposits of gravel in a total of 350 acres is owned by the company. Capacity of the plant is estimated at 2000 tons of washed and screened gravel per day.

The company is owned entirely locally and is incorporated under the laws of Missis-

Ocean Stone and Gravel Company Makes Large Contract

PURCHASE of the entire production of gravel of the Newport Gravel Corporation of Newport News, Va., by the Ocean Stone and Gravel Corporation of Tampa, Fla., has been announced. The transaction, which was closed recently by W. H. Freeman of the Norfolk branch of the Newport News concern, calls for the shipment of approximately 300,000 tons a year for an indefinite length of time with the purchase price amounting to about $450,000 for the year.

The gravel will be shipped from the New-

month will be loaded at the pit. Movement of the gravel began with the departure of the steamship *Irene*, the first of the boats to load. Five thousands tons will be carried by each ship.

Construction of its new plant at Deep Bottom by the Newport Gravel Corporation was completed recently. Equipment was installed capable of loading a 5000-ton ship in two days. Although the contracts call for about 300,000 tons a year to be sent to Florida, Mr. Freeman said the store of gravel on Curles Neck Farm will enable the company to produce in excess of that amount.—*Roanoke (Va.) News.*

The South Dakota State Cement Plant Administrators are Optimistic

THE report reaching Governor Gunderson of the successful operation of the state cement plant at Rapid City, S. D., has been very gratifying to the executive and has caused him to redouble his efforts to make the plant a leading administrative enterprise.

Irwin D. Aldrich of the state department of agriculture has taken an interest in the subject of cement and in the state's manufacture of it. He finds that the cement used in South Dakota exceeds 750,000 bbl. annually and believes that with ordinary development this will increase for several years. If new uses for cement continue to develop, Mr. Aldrich sees an even more rapid output at the state plant.

The South Dakota cement plant has a capacity of 2000 bbl. per day. Its annual output, now that a reorganization has been effected, is expected to reach approximately 550,000 bbl. a year.

"The natural territory of the plant," Mr. Aldrich said recently in discussing the state's enterprises here, "that territory in which freight rates permit it to sell in competition with cement plants elsewhere is not alone in the state of South Dakota. It comprises a large part of Wyoming where concrete is used extensively, a part of North Dakota and Montana and a very rich territory in central and western Nebraska reached over the Burlington and Northwestern lines."

In view of the enormously increasing demands for cement each year, state officials believe that the "modest addition of 600,000 bbl" from the South Dakota plant will be easily absorbed.—*Sioux Falls (S. D.) Argus-Leader.*

Childress, Texas, Chamber of Commerce Out to Promote New Gypsum Plant

THE local Chamber of Commerce has begun a campaign to interest the Certainteed Products Co. of New York, owners of the mineral rights near Childress, in the erection of a large plaster mill at that city. The bed, which comprises 2500 acres, is said to have been tested by drilling and found to consist of free gypsite of a high quality lying to a depth of 50 ft. below the surface. Railroad facilities are good, the Fort Worth and Denver R. R. being only three miles away, and local business men are agreeable to build the spur connecting the beds to the railroad. There is a large quantity of soft water available. The chief inducement for the mill lies in the proximity of a cheap fuel. For this purpose natural gas could be piped from the nearby Shamrock field. The company already operates a mill at Acme, Texas, 23 miles from Childress.—*Childress (Texas) Index.*

First Cement Barge for Cuban Service

THE steel barge El Morro, on which the Cuban flag was raised yesterday at the dock of the Virginia Portland Cement Corporation, at South Norfolk, Va., was towed out of the harbor recently by the Munson Line steamer Hunplace, which will deliver her at Havana, Cuba, where she will enter service.

The El Morro, which can carry 5,000 bbl. of cement in bulk, will be used to transport cement from the plant of the Cuban Portland Cement Co., at Muriel Bay, to Havana, 40 miles distant. The Cuban Portland Cement Corporation is controlled by the International Cement Corporation, of New York, N. Y., of which the local concern is a subsidiary.—*Norfolk (Va.) Ledger-Dispatch.*

International Cement to Build Plant at New Orleans

ACCORDING to an announcement in the *New Orleans (La.) Tribune,* the International Cement Co., who a short time ago took over the Phoenix Cement Co. lease on the Industrial Canal in New Orleans, will soon start the erection of a $1,000,000 plant on that site.

Increase in Southern States' Cement Capacity

IN JULY the new plant of the Clinchfield Portland Cement Corp. at Clinchfield, Ga., was placed in operation. The initial capacity of this plant is 2500 bbl. daily. The new kiln of the Alabama Portland Cement Co. also began production during the month.

Universal Cement Orders Partial Shutdown of Universal, Pa., Plant

A PARTIAL shutdown of its big plant at Universal, Pa., was ordered by the Universal Portland Cement Co., subsidiary of the United States Steel Corporation. Overexpansion of the producing capacity of cement mills serving western Pennsylvania, Ohio and West Virginia made this move advisable, officials of the company said.

Total stocks on hand in the United States at the end of July were 1,500,000 barrels greater than a year ago, it was said. This does not indicate a falling off in cement demand, it was explained, but rather that the producing capacity has been increased more rapidly than growth in demand has warranted.

While there were 12 mills producing portland cement in this district last year there are now 14 in operation and another under construction. Five years ago there were only nine plants operating in this territory.—*Buffalo (N. Y.) News.*

National Cement Company, Ltd. Elects Directors

AT a special meeting held in Montreal, Can., of the National Cement Company, Ltd., Canada, the following board of directors was elected:

Hon. J. M. Wilson, Donat Raymond, Hon. Georges Simard, L. H. Timmins, E. C. Vidricaire, Richard K. Meade, Jos. Versailles.

Mr. Versailles was afterwards elected president of the board and Mr. Raymond, vice-president.

The president states that manufacturing will definitely start in the first days of November.

California Cement Producers Ask Higher Import Duty on Cement

AT a recent public hearing granted by the United States tariff commissioners, Thomas O. Marvin and A. P. Dennis, in Los Angeles, Calif., Norman McBeth of the Riverside Portland Cement Co.; Charles Lowe, Monolith Co., and J. D. Dart of California Portland Cement Co. made argument for a higher import tariff on cement. They stated that about a third of the cement imported into the United States comes through Los Angeles, and therefore that district is more affected than any other to the present time, and that lower wage costs and favorable rates of exchange act to the advantage of the foreign cement producers.

Dixie Lime Products Company Buys Large Limestone Deposits

ONE of the largest transactions in the purchase of lime properties in the state has just been concluded in Ocala in the sale by the Florida Lime Co. of its large lime deposits at Zuber, Fla., a few miles north of here on the Atlantic Coast Line railroad, to the Dixie Lime Products Co., a newly organized company, also of Ocala, Fla., and a subsidiary of the Commercial Lime Co., which is owned by Whitfield Palmer, Ocala; J. H. Williams, Reddick, Virgil Lanter of Jacksonville and others.

J. M. Meffert of Ocala is the principal stockholder of the Florida Lime Co. and is one of the original lime promoters of the state.

The Commercial Lime Co. owns and operates a large lime plant and lime rock plant for road material at Reddick, maintaining offices in Ocala, with sales office in Jacksonville. The Dixie company will also maintain general offices in Ocala and sales offices in Jacksonville.

The lime property at Zuber has been operated for more than 30 years as a commercial lime plant by the Florida Lime Co. and is generally regarded as one of the largest high grade lime properties in the state.—*Tampa (Fla.) Tribune.*

Record Portland Cement Output in August

Shipments for Month Total 18,383,000 Barrels

PRODUCTION and shipments of portland cement during the month of August were the highest ever recorded for any month in the industry, according to statistics compiled by the Bureau of Mines, Department of Commerce. Production shows an increase of more than 8% and shipments of 9% over August, 1924. Portland cement stocks continue the seasonal decline, but are nearly 12% greater than in August, 1924. Another new plant, located in Ohio, is included for the first time in the statistics. The following tables, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are based mainly on the reports of producers of portland cement. The August, 1925, totals include estimates for two plants.

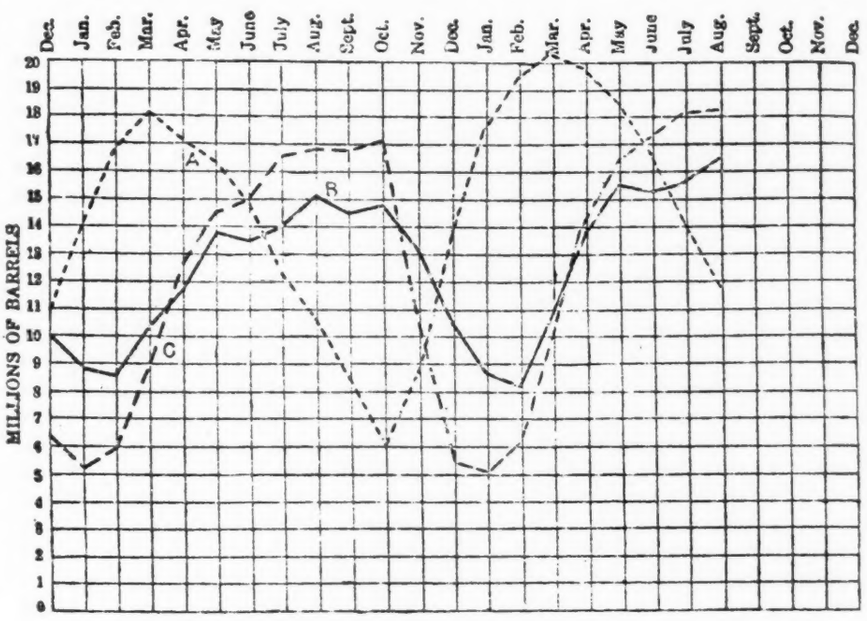
Clinker Stocks

Stocks of clinker, or unground cement, at the mills at the end of August, 1925, amounted to about 5,634,000 bbl. compared with 6,961,000 bbl. (revised) at the beginning of the month.

Distribution of Cement

The following figures show shipments from portland cement mills distributed among the states to which cement was shipped during June and July, 1924 and 1925:

Monthly fluctuations in production, shipments, and stocks of finished Portland cement



(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES, IN JUNE AND JULY, 1924 AND 1925, IN BARRELS*

Shipped—	June		July	
	1924	1925	1924	1925
Alabama	115,416	214,195	212,720	256,741
Alaska	132	1,284	1,432	2,816
Arizona	31,126	32,451	30,474	37,842
Arkansas	89,507	92,101	129,334	78,059
California	954,751	1,066,088	942,273	1,061,048
Colorado	140,995	120,818	161,005	118,272
Connecticut	181,858	172,564	192,957	176,644
Delaware	34,413	37,330	46,078	43,326
District of Columbia	60,307	81,334	79,851	82,133
Florida	148,144	348,330	173,184	341,849
Georgia	113,412	129,748	107,824	132,050
Hawaii	944	6,108	5,451	993
Idaho	20,583	28,122	23,922	28,498
Illinois	1,311,151	1,636,329	1,533,330	1,853,734
Indiana	556,814	617,360	744,692	658,042
Iowa	393,866	310,558	401,855	327,155
Kansas	194,394	233,522	199,437	226,787
Kentucky	157,555	231,491	188,068	229,652
Louisiana	100,299	100,016	109,385	99,111
Maine	49,013	43,541	50,045	41,475
Maryland	192,865	249,105	218,371	247,835
Massachusetts	372,620	350,620	388,173	386,058
Michigan	1,133,346	1,264,462	1,205,309	1,229,598
Minnesota	451,614	409,235	405,863	436,453
Mississippi	38,886	66,012	41,506	67,446
Missouri	290,852	583,561	427,101	683,097
Montana	22,106	28,904	20,985	31,486
Nebraska	132,394	181,516	158,955	203,863
Nevada	11,463	10,784	8,806	10,068
New Hampshire	39,026	40,837	41,240	41,843
New Jersey	682,058	737,572	738,895	760,944
New Mexico	27,893	18,406	22,007	16,323
New York	1,986,895	2,090,644	2,041,145	2,170,960
North Carolina	278,936	324,201	259,730	343,683
North Dakota	45,337	66,089	72,154	55,305
Ohio	958,245	1,099,767	1,211,851	1,099,016
Oklahoma	189,119	225,879	177,823	225,729
Oregon	122,893	134,038	140,656	143,672
Pennsylvania	1,298,303	1,869,299	1,580,596	1,869,377
Porto Rico	5,186	0	0	0
Rhode Island	73,286	89,213	60,649	75,383
South Carolina	47,118	85,087	42,238	75,376
South Dakota	54,540	59,120	70,244	55,487
Tennessee	129,124	185,536	148,173	208,562
Texas	344,403	411,795	388,590	418,401
Utah	53,956	37,733	55,413	38,975
Vermont	72,169	26,978	35,469	26,245
Virginia	118,672	172,760	156,644	180,025
Washington	275,028	328,589	179,521	334,466
West Virginia	215,505	161,484	226,563	164,874
Wisconsin	524,846	589,687	586,677	562,363
Wyoming	46,734	31,290	47,769	25,691
Unspecified	67,442	3,996	66,488	48,647
	14,957,540	17,417,489	16,558,921	18,033,478
Foreign countries	78,460	83,511	55,079	97,522
Total shipped from cement plants	15,036,000	17,501,000	16,614,000	18,131,000

*Includes estimated distribution of shipments from three plants in June, 1924, and July, 1925; from four plants in June, 1925; and from five plants in July, 1924.

IMPORTS AND EXPORTS* EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES IN JULY, 1925

Exported to—	Barrels	Value
Canada	1,637	$8,988
Cuba	31,170	74,332
Other West Indies	8,916	20,451
Mexico	13,296	35,456
Central America	2,753	8,791
South America	35,673	110,893
Other countries	4,696	27,632
	98,141	$286,543

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.

IMPORTS AND EXPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1924 AND 1925

Month—	Imports				Exports			
	1924		1925		1924		1925	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	153,839	$250,799	229,838	$361,098	88,586	$252,497	71,596	$207,547
February	162,930	219,588	199,077	206,308	62,606	194,110	56,249	181,356
March	160,517	254,745	218,054	374,839	91,224	254,687	65,248	200,410
April	148,137	227,300	197,686	280,826	83,200	229,183	89,508	263,831
May	161,304	232,950	186,897	286,959	88,850	262,290	85,385	250,845
June	196,655	283,112	254,937	409,539	74,064	229,852	71,343	217,899
July	108,944	181,111	335,118	499,602	60,139	186,073	98,141	286,543
August	192,634	305,690	(†)	(†)	85,883	251,904	(†)	(†)
September	138,369	232,991	.....	.....	69,470	206,921	.....	.....
October	214,987	337,199	.....	.....	79,180	253,479	.....	.....
November	198,806	305,598	.....	.....	42,490	130,519	.....	.....
December	173,814	285,481	.....	.....	52,851	163,639	.....	.....
	2,010,936	$3,116,564	.....	.....	878,543	$2,615,154	.....	.....

†Imports and exports in August, 1925, not available.

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII AND PORTO RICO IN JULY, 1925

	Barrels	Value
Alaska	2,526	$7,853
Hawaii	1,827	4,239
Porto Rico	17,379	40,722
	21,732	$52,814

Lower Local Cement Rates in Kansas

APPROVAL to reduce rates on cement from Bonner Springs and Sunflower to Kansas points was given the Santa Fe R. R. recently.

IMPORTS AND EXPORTS*

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES AND BY DISTRICTS IN JULY, 1925

Imported from—	District into which imported—	Barrels	Value
Belgium	Massachusetts	34,649	$58,059
	Philadelphia	98,828	135,847
	Florida	51,574	76,865
	New Orleans	5,064	4,991
	Los Angeles	19,314	29,975
	San Francisco	2,746	5,007
	Washington	8,311	11,393
	Hawaii	35,846	50,466
	Porto Rico	5,897	11,000
	Total	262,229	$383,603
Canada	Maine and New Hampshire	536	$1,453
	Vermont	10,045	16,176
	Saint Lawrence	9,782	16,025
	Rochester	3,860	4,579
	Buffalo	13,458	22,735
	Total	37,681	$60,968
Denmark	Porto Rico	8,501	$13,617
Germany	New Orleans	1,072	$1,055
Japan	San Francisco	.....	$3
	Hawaii	292	412
	Total	292	$415
Norway	Maine and New Hampshire	4,468	$6,376
	Massachusetts	5,981	9,748
	Washington	14,894	23,810
	Total	25,343	$39,934
United Kingdom	Ohio	.....	$10
	Grand total	335,118	$499,602

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS IN AUGUST, 1924 AND 1925, AND STOCK IN JULY, 1925, IN BARRELS

Commercial District	Production—August, 1924	Production—August, 1925	Shipments—August, 1924	Shipments—August, 1925	Stocks at end of August, 1924	Stocks at end of August, 1925	Stocks at end of July, 1925*
E'n Penn., N. J. & Md.	3,621,000	3,776,000	4,263,000	4,402,000	2,092,000	1,784,000	2,460,000
New York	803,000	867,000	942,000	1,001,000	645,000	623,000	757,000
Ohio, W'n Penn. & W. Va.	1,707,000	1,810,000	1,882,000	1,905,000	1,018,000	1,517,000	1,612,000
Michigan	1,105,000	1,192,000	1,175,000	1,285,000	521,000	873,000	967,000
Wis.,† Ill., Ind. & Ky.	2,133,000	2,425,000	2,529,000	2,914,000	1,554,000	2,122,000	2,611,000
Va., Tenn., Ala. & Ga.	1,049,000	1,302,000	1,241,000	1,263,000	414,000	303,000	264,000
E'n Mo., Ia., Minn. & S. D.‡	1,596,000	1,632,000	1,660,000	1,952,000	2,046,000	2,080,000	2,399,000
W'n Mo., Neb., Kans. & Okla.	1,033,000	1,170,000	1,036,000	1,268,000	1,142,000	1,430,000	1,529,000
Texas	414,000	481,000	433,000	452,000	245,000	262,000	232,000
Colo. & Utah	283,000	210,000	259,000	230,000	191,000	362,000	382,000
California	1,063,000	1,181,000	1,056,000	1,234,000	334,000	381,000	435,000
Ore., Wash. & Mont.	321,000	423,000	379,000	477,000	464,000	194,000	248,000
	15,128,000	16,419,000	16,855,000	18,383,000	10,666,000	11,931,000	13,896,000

*Revised. †Began producing June, 1924. ‡Began producing December, 1924, and shipping January, 1925.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1924 AND 1925, IN BARRELS

Month—	Production 1924	Production 1925	Shipments 1924	Shipments 1925	Stocks at end of month 1924	Stocks at end of month 1925
January	8,788,000	8,856,000	5,210,000	5,162,000	14,155,000	17,656,000
February	8,588,000	8,255,000	5,933,000	6,015,000	16,815,000	19,689,000
March	10,370,000	11,034,000	8,995,000	10,279,000	18,189,000	20,469,000
First quarter	27,746,000	28,145,000	20,138,000	21,456,000	.....	.....
April	11,726,000	13,807,000	12,771,000	14,394,000	17,159,000	19,877,000
May	13,777,000	15,503,000	14,551,000	16,735,000	16,403,000	18,440,000
June	13,538,000	15,387,000	15,036,000	17,501,000	14,903,000	16,409,000
Second quarter	39,041,000	44,697,000	42,358,000	48,630,000	.....	.....
July	14,029,000	15,641,000	16,614,000	18,131,000	12,319,000	*13,896,000
August	15,128,000	16,419,000	16,855,000	18,383,000	10,666,000	11,931,000
September	14,519,000	.....	16,827,000	.....	8,404,000	.....
Third quarter	43,676,000	.....	50,296,000	.....	.....	.....
October	14,820,000	.....	17,160,000	.....	6,073,000	.....
November	13,141,000	.....	10,289,000	.....	8,928,000	.....
December	10,435,000	.....	5,506,000	.....	13,913,000	.....
Fourth quarter	38,396,000	.....	32,955,000	.....	.....	.....
	148,859,000	.....	145,747,000	.....	.....	.....

*Revised.

Tenth Chemical Exposition Program Completed

THE program has been completed for the Tenth Exposition of Chemical Industries which is to be held at the Grand Central Palace, New York, September 28 to October 3, 1925. There will be meetings, speakers and motion pictures and other events of importance.

The course of lectures which is open to students and any others interested in chemical engineering problems as related to practice will be held from 9 to 12 a. m. in the auditorium from September 29 to October 3.

Group I

September 29, 10 to 12 A. M.

Disintegration: Crushing, grinding and pulverizing, by **A. S. Taggart,** Columbia University.

September 30, 10 to 12 A. M.

Mechanical Separation: Separation of Solids from Liquids: Filtration, Grading, Classifying, Settling and Thickening. By **Arthur Wright,** Filtration Engineers, Inc., New York.

"Separation of Solids from Solids and Solids from Gases." By **S. B. Kanowitz,** Raymond Bros. Impact Pulv. Co., New York.

October 2, 10 to 12 A. M.

"Handling of Materials: Vertical, Lateral and Horizontal Transportation." By **A. E. Marshall,** Corning Glass Works, New York.

Group II

For advanced students and those with more extensive knowledge of chemistry and chemical engineering.

September 29, 10 to 12 A. M.

Pulverizing and Grinding. Harlow Hardinge, Hardinge Co., New York.

September 30, 10 to 12 A. M.

Mechanical Separation: Separation of Solids from Solids According to Particle Size. **Albert R. Reed,** W. S. Tyler Co., Cleveland, Ohio.

New Developments and Operation in Thickening and Clarification. Noel Cunningham, Hardinge Co., New York.

Liquids and Centrifugal Separation. W. D. Cleary, De Laval Separator Co., New York.

October 2, 10 to 12 A. M.

Slate: A Construction Material of Diversified Uses. D. K. Boyd, National Slate Association, Philadelphia.

Handling of Materials: Conveying with Steel Belting. James E. Pasman, Sandvik Steel, Inc., N. Y.

Motion pictures will be shown each afternoon and evening in a special auditorium at the Grand Central Palace. Program of interest to the industry is as follows:

Quarrying and Shaping Slate: Nature's Product of Manifold Uses (two reels). Courtesy National Lime Association. (Speaker accompanied.)

Lime: Its Manufacture and Use in Industry and Construction (one reel). Courtesy B. & O. R. R. and National Lime Association.

The Story of Portland Cement (one reel). **The Story of Lead Mining and Milling** (three reels). Courtesy U. S. Bureau of Mines.

Ontario Graphite Mines, Gypsum Mining in Ontario, The Path of Balls in Tube Mills. Courtesy Ontario Department of Mines.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	1.00	.....	1.75	1.50	1.50	1.50
Eastern Pennsylvania	1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Walford, Penn.	1.00	1.30	.....	1.50h	1.50h	.....
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Alton, Ill.	1.85	.....	1.85	1.50	.....	.....
Bloomville, Middlepoint, Dunkirk Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.10	.....	1.20	1.00	1.05	1.05
Chicago, Ill.	.80	1.00	1.00	1.00	1.00	1.00
Columbia, Krause, Valmeyer, Ill.	1.00@1.75	1.20	1.20	1.20	1.20	1.40
			Flux all at 1.30			
Cypress, Ill.	1.25	1.15	1.10	1.10	1.10	1.10
Dundas, Ont.	.70	.90	.90	.90	.90	.90
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Northern New Jersey	1.30	.....	1.80	1.60	1.40	.....
River Rouge, Mich.	1.10	1.10	1.10	1.10	1.10	1.10
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.85	1.35	1.05	.95	.90	.90
Stone City, Iowa	.75	.....	1.20	1.10	.....	.....
Toronto, Ont.	1.60	1.95	1.80	1.80	1.80	1.80
Waukesha, Wis.	.90	.90	.90	.90	.90	.....
Wisconsin Points	.50	.....	1.00@1.15	.90@1.05	.90@1.05	.....
SOUTHERN:						
Alderson, W. Va.	.60	1.60	1.60	1.50	1.40	.....
Allgood, Ala.			Crusher run, fines out, for flux, 1.00 per net ton			
Cartersville, Ga.	1.65	1.65	1.65	1.15	1.15	1.15
Chico, Texas	1.00	1.40	1.35	1.25	1.20	1.10
El Paso, Texas	1.00	1.10	1.10	1.10	1.10	.....
Ft. Springs, W. Va.	.50	1.60	1.50	1.35	1.25	.....
Graystone, Ala.			Crusher run fluxing stone, 1.00 per net ton			
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rockwood, Ala.	.90	.....	.....	.....	1.00	.90
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atkinson, Kans.	.25	2.00	2.00	2.00	2.00	1.60‖@1.80
Blue Spr'ngs & Wymore, Neb.	.20	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.00	.....
Kansas City, Mo.	1.00	1.80	1.80	1.80	1.80	1.80
Rock Hill, St. Louis Co., Mo.	1.25	1.35	1.35	1.35	1.35	1.25

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.75	1.75	1.75	1.75	1.75	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.50e	1.80	1.80	1.40	1.40	.....
Oakland and El Cerritto, Cal.	1.00	1.00	1.00	.90	.90	.....
San Diego, Calif.	.70e	1.80f	1.60	1.40g	1.30	.....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	2.00	2.10	2.10	1.70	1.70	1.70
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.70

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley and Red Granite, Wis.—Granite	1.50	1.60	1.35	1.25	1.25	1.00
Coldwated, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite	.50	1.75	1.75	.....	1.60	.....
Eastern Penn.—Sandsone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Lithonia, Ga.	.75	1.75	1.60	1.25	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	.....
Richmond, Calif. (Basalt)	.75*	.....	1.50*	1.50*	1.50*	.....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone
(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
50% thru 4 mesh	3.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Belfast and Rockland, Me. (rail), Lincolnville, Me. (water), analysis $CaCO_3$ 90.04%; $MgCO_3$ 1.5%, 100% thru 14 mesh, bags	4.50
Bulk	3.00
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh	1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized	3.00
50% thru 50 mesh	1.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Texas—90% thru 100 mesh	4.50
50% thru 100 mesh	3.50
90% thru 50 mesh	3.00
50% thru 50 mesh	2.50
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Dundas, Ont., Can.—Analysis, 53.80% $CaCO_3$, 43.31% $MgCO_3$; 35% thru 100 mesh, 50% thru 50 mesh, 100% thru 10 mesh; bags, 4.75; bulk	3.00
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Janesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk	2.70
Linville Falls, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.10; bulk	3.60
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Mountville, Va.—Analysis 76.60% $CaCO_3$, 22.83% $MgCO_3$; 50% thru 100 mesh, 100% thru 20 mesh—125-lb. hemp bags	5.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis, 95% $CaCO_3$; 50% thru 200 mesh	1.75@ 2.00
Asphalt filler dust, 80% thru 200 mesh	3.00@ 3.50
Waukesha, Wis.—90% thru 100 mesh	3.70
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50
West Rutland, Vt.—90% thru 100 mesh; 7.00 in bags; bulk	4.50
West Stockbridge, Mass.—Analysis 95% $CaCO_3$; 50% thru 100 mesh, cloth bags, 5.25; paper, 4.75; bulk	3.25

Agricultural Limestone
(Crushed)

Alderson, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh	1.50
Atlas, Ky.—Analysis over 90% $CaCO_3$; 90% thru 4 mesh	1.00@ 2.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh	.60@ 1.00

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Agricultural Limestone

(Continued from preceding page)

Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh 1.75
50% thru 4 mesh 1.50
Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh 1.35
Cypress, Ill.—90% thru 100 mesh 1.25
50% thru 100 mesh, 90% thru 50 mesh, 50% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 1.15
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50
Garnet, Okla.—All sizes 1.25
Gary, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .75
Kansas City, Mo.—50% thru 100 mesh 1.25
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh 2.00
Screenings (¼ in. to dust) 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh .... 1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh 1.60
Milltown, Ind.—Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$; 30.8% thru 100 mesh, 38% thru 50 mesh ..... 1.45@ 1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh 1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh 1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes 1.25
Waukesha, Wis.—Test, 107.38% bone dry, 100% thru 10 mesh; bags, 2.85; bulk 2.10

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk 3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk .... 3.00@ 3.50
Rocky Point, Va.—80% thru 200 mesh 3.00@ 3.50
Waukesha, Wis.—97% thru 100 mesh, bulk 4.00

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Glass Sand:
Berkeley Springs, W. Va ..... 2.00@ 2.25
Cedarville and S. Vineland, N. J.—
Damp 1.75
Dry 2.25
Cheshire, Mass.:
6.00 to 7.00 per ton; bbl 2.50
Columbus, Ohio 1.25
Estill Springs and Sewanee, Tenn. 1.50
Franklin, Penn. 2.00
Gray Summit and Klondike, Mo. 2.00
Los Angeles, Calif.—Washed 5.00
Mapleton Depot, Penn. ..... 2.00@ 2.25
Massillon, Ohio 3.00
Mineral Ridge and Ohlton, Ohio 2.50
Oceanside, Calif. 3.00
Ottawa, Ill.—Chemical and mesh guaranteed 1.25
Pittsburgh, Penn.—Dry 4.00
Damp 3.00
Red Wing, Minn.:
Bank run 1.50
Ridgway, Penn. 2.00
Rockwood, Mich. ..... 2.75@ 3.25
Round Top, Md. 2.25
San Francisco, Calif. ..... 4.00@ 5.00
St. Louis, Mo. 2.00
Sewanee, Tenn. 1.50
Thayers, Penn. 2.50
Utica, Ill. ..... 1.00@ 1.15
Zanesville, Ohio 2.50
Miscellaneous Sands:
Aetna, Ind.:
Core, Box cars, net, .35; open-top cars ..... .30
Albany, N. Y.:
Molding coarse 2.00
Molding fine, brass molding 2.25
Sand blast 3.75

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. S'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95	.....	.....	.85	.....
Erie, Pa.	.....	1.00*	1.50*	.....	1.75*	.....
Farmingdale, N. J.	.53	.48	1.05	1.20	1.10	.....
Hartford, Conn.	.65*	.....	.....	.....	.....	.....
Machias Jct., N. Y.	.....	.75	.75	.75	.75	.75
Montoursville, Penn.	.....	1.10	1.10	1.00	.90	.90
Northern New Jersey	.50	.50	1.25	1.25	1.25	.....
Olean, N. Y.	.....	.75	.75	.75	.75	.75
Shining Point, Penn.	.....	.....	1.00	1.00	1.00	1.00
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.60@ .85	.60@ .85	.....	.....	.....	1.10@1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Covington and Summit Grove, Ind.	.60@ .85	.60@ .85	.75@ .85	.75@ .85	.75@ .85	.75@ .85
Barton, Wis.	.....	.50	.75	.75	.75	.75
Boston, Mass.‡	1.60	1.60	2.50	.....	2.25	2.00
Chicago, Ill.	1.20	1.10	1.10	.....	.....	1.00
Columbus, Ohio	.65	.65	.65	.65	.65	.65
Des Moines, Iowa	.40	.40	1.20	1.50	1.50	1.50
Eau Claire, Wis.	.40	.40	.80	.....	.....	.85
Elkhart Lake, Wis.	.60	.40	.50	.50	.50	.50
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Haven, Mich.	.....	.40@ .80	.....	.60@1.00	.....	.....
Grand Rapids, Mich.	.50	.50	.....	.80	.70	.70
Hamilton, Ohio	.....	1.00	.....	.....	1.00	.....
Hersey, Mich.	.....	.50	.....	.....	.....	.70
Humboldt, Iowa	.....	.85	2.00	2.00	2.00	.....
Indianapolis, Ind.	.60	.60	.....	.90	.75@1.00	.75@1.00
Janesville, Wis.	.....	.65@ .75	.....	.....	.65@ .75	.....
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn., and Appleton	.....	.40	.....	1.25	1.25	1.25
Mattoon, Ill.	.75	.75	.75	.75	.75	.75
Milwaukee, Wis.	.....	1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.45@ .50	.45@ .50	.....	1.25	1.25	.....
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.55	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.60	.90	.90	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	.....	.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.10	1.10	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.	.....	.40@ .70	.30@ .50	.50@ .60	.60	.60
Zanesville, Ohio	.70	.60	.60	.60	.90	.....
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.		All gravel, 1.50.		
Chattanooga, Tenn.	.....	1.40	1.35	1.20	1.20	1.20
Chehaw, Ala.	00@ .30	.....	.40	.50	.....	.....
Knoxville, Tenn.	.75@1.00	.75@1.00	1.20	1.20	1.20	1.00
Lindsay, Texas	.....	.....	.....	.....	.55	.....
Macon, Ga.	.....	.50	.....	.75	.85	.....
New Martinsville, W. Va.	1.00	.90@1.00	.....	1.30	.....	.80@ .90
Roseland, La.	.50	.50	2.00	.....	1.00	.....
Smithville, Texas	.....	.90	.90	.90	.90	.75
WESTERN:						
Baldwin Park, Calif.	.20	.20	.40	.50	.50	.....
Kansas City, Mo.	.80	.70	.....	.....	.....	.....
Los Angeles, Calif.	.50	.50	.92	.92	.92	.....
Los Angeles district (bunkers)†	1.50	1.40	1.85	1.85	1.85	1.85
Phoenix, Ariz.	1.25*	1.00*	2.50*	2.00*@2.25*	1.75*	1.50*
Pueblo, Colo.	1.10*	.90*	.....	1.60*	.....	1.50*
San Diego, Calif.	.....	.60	1.25	1.20	1.00	1.00
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80	.....	.55@ .75	.....	.....	1.00
Chehaw, Ala.	00@ .30	.....	.....	.....	.....	.....
Chicago, Ill.	.95	.....	.....	.....	.....	.....
Des Moines, Iowa	.50	.....	.....	.....	.....	.....
Dudley, Ky. (crushed silica)	1.10	1.10	.....	.95	.....	.....
East Hartford, Conn.			Sand, .75 per cu. yd.			
Elkhart Lake, Wis.	.50	.....	.....	.....	.....	.....
Gainesville, Texas	.....	.95	.....	.....	.....	.55
Grand Haven, Mich.	.....	.....	.....	.....	.....	.80@1.00
Grand Rapids, Mich.	.....	.....	.....	.60	.....	.....
Hamilton, Ohio	.....	.....	.....	.....	.70	.....
Hershey, Mich.	.....	.....	.....	.55	.....	.....
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Lindsay, Texas	.....	1.10	.....	.....	.....	55
Macon, Ga.	.....	.35	.....	.....	.....	.....
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Montezuma, Ind.	.....	.....	.....	.....	.....	.60
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.50
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waukesha, Wis.	.60	.60	.60	.60	.60	.60
Winona, Minn.	.60	.60	.60	.60	.60	.60
York, Penn.	1.00	1.00	.....	.....	.....	.....
Zanesville, Ohio	.....	.....	.....	.....	.....	.....

(a) ¾ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.

Miscellaneous Sands

(Continued from preceding page)

Arenzville, Ill.:		
Core		.75
Molding fine	1.50@	1.75
Beach City, Ohio:		
Core		1.75
Stone, sawing, coarse		1.75
Molding, fine and coarse, washed	1.75@	2.25
Traction	1.50@	2.00
Furnace lining	2.00@	2.50
Cheshire, Mass.—Furnace lining, molding fine and coarse		5.00
Sand blast	5.00@	8.00
Stone sawing		6.00
Columbus, Ohio:		
Core	.30@	1.50
Traction	.30@	1.25
Molding coarse	1.25@	1.50
Stone sawing		1.50
Molding fine	1.75@	2.00
Furnace lining	2.00@	2.50
Sand blast	3.00@	4.00
Brass molding		2.00
Eau Claire, Wis.:		
Sand blast	3.00@	3.25
Traction		.65
Roofing sand		4.25
Elco, Ill.:		
Ground silica per ton in carloads	18.00@	31.00
Elnora, N. Y.:		
Brass molding		1.75
Estill Springs and Sewanee, Tenn.:		
Molding fine and core		1.25
Roofing sand, sand blast, traction	1.35@	1.50
Franklin, Penn.:		
Glass sand		2.25
Core		2.00
Molding, fine and coarse		1.75
Gray Summit and Klondike, Mo.:		
Core, roofing and brass molding		2.00
Molding fine and coarse, traction		1.75
Furnace lining		1.00
Stone sawing	.85@	1.00
Joliet, Ill.:		
No. 2 molding sand; also loam for luting purposes and open-hearth work	.65@	.85
Kasota, Minn.:		
Stone sawing		1.00
Mapleton Depot, Penn.:		
Glass sand	2.00@	2.25
Molding fine and traction		2.00
Massillon, Ohio:		
*Glass sand		3.00
Core, furnace lining, molding fine and coarse		2.50
Traction		2.25
Michigan City, Ind.:		
Core, in open car, .30; in box car		.35
Traction		.25
Mineral Ridge and Ohlton, Ohio:		
Furnace lining, molding coarse, sand blast, traction (damp)		1.75
Roofing sand (damp)	1.75@	2.00
Core, molding fine (damp)		2.00
Glass sand (dry)		2.50
Montoursville, Penn.:		
Traction		1.10
Core	1.25@	1.50
New Lexington, Ohio:		
Molding fine		2.00
Molding coarse		1.50
Oceanside, Calif.:		
Roofing sand		**3.50**
Ottawa, Ill.:		
Molding coarse (crude silica, not washed or dried)	.75@	.85
Red Wing, Minn.:		
Core, furnace lining, stone sawing		1.50
Molding fine and coarse, traction		1.25
Sand blast		3.50
Filter sand		3.75
Ridgway, Penn.:		
Glass sand		2.00
Molding fine and coarse		1.50
Core and furnace lining		1.75
Round Top, Md.:		
Core		1.60
Glass sand		2.00
Sand blast		2.25
Roofing sand		2.25
St. Louis, Mo.:		
Core	1.00@	1.75
Furnace lining		1.50
Molding fine	1.50@	2.50

Miscellaneous Sands

(Continued)

Molding coarse	1.25@	1.75
Roofing sand		1.75
Sand blast	3.50@	4.50
Stone sawing	1.25@	2.25
Traction		1.25
Brass molding	2.00@	3.00
San Francisco, Calif.:		
(Washed and dried) — Core, sand blast and brass molding	3.50@	5.00
Furnace lining and roofing sand	3.50@	4.50
Molding fine and traction		3.50
Molding coarse		4.50
(Direct from pit)—Core and molding fine	2.50@	4.50
Sewanee, Tenn.:		
Molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding		1.25
Skerkston, Ont.:		
Traction (lake sand)		.65
Tamalco, Ill.:		
Molding coarse	1.25@	1.50
Tamms, Ill.:		
Ground silica per ton in carloads	20.00@	31.00
Thayers, Penn.:		
Core		2.00
Molding fine and coarse		1.25
Traction		2.25
Utica, Ill.:		
Core and furnace lining		.75
Molding fine		.60
Molding coarse		.65
Utica, Penn.:		
Core		2.00
Molding fine and coarse		1.75
Warwick, Ohio:		
Core, molding fine and coarse (green)		1.75
Core, molding fine (dry)		2.25
Zanesville, Ohio:		
Glass sand		2.50
Furnace lining		2.00
Molding fine and brass molding	1.50@	1.75
Molding coarse		1.50
Core and traction		2.50

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium and Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00	.....	1.25	.....	.....	.....
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05	1.30@1.35	.....	1.40@1.45	.....	1.45	1.45
Jackson, Ohio	.....	.....	.....	1.30@1.35	1.00@1.05	.....	1.30@1.35
Toledo, Ohio	1.50	1.25	1.25	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.	.....	1.55	.....	1.55	1.55	1.55	1.55
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.	.....	.....	12.00	.....	.....	.....	.....	2.20
Buffalo, N. Y.	.....	12.00	12.00	12.00	.....	.....	.....	.....
Lime Bridge, Penn.	.....	.....	.....	.....	.....	.....	**5.00a**	.....
West Stockbridge, Mass. (f)	13.00	10@11.00	5.00	.....	.....	.....	.....	2.25t
Williamsport, Penn.	.....	.....	10.00	.....	.....	.....	6.00	.....
York, Penn.	.....	10.50	10.50	11.50	.....	.....	8.50	1.65i
CENTRAL:								
Cold Springs, Ohio (f)	.....	10.00	9.00	.....	9.00	11.00	9.00	.....
Delaware, Ohio	12.50	10.00	9.00	10.50	9.00	15.00	9.00	1.50
Gibsonburg, Ohio (f)	12.50	.....	9.00	.....	9.00	11.50	.....	.....
Luckey, Ohio (f)	12.50	.....	.....	.....	.....	.....	.....	.....
Huntington, Ind.	12.50	10.00	9.00	.....	.....	.....	.....	.....
Luckey, Ohio (f)	12.50	.....	.....	.....	.....	.....	.....	.....
Marblehead, Ohio	.....	10.00	9.00	.....	.....	.....	9.00	1.50c
Marion, Ohio	.....	10.00	9.00	.....	.....	.....	9.00	1.50c
Sheboygan, Wis.	.....	.....	.....	.....	.....	.....	**9.50**	.....
Tiffin, Ohio	.....	.....	.....	.....	9.00	.....	.....	.....
White Rock, Ohio	12.50	.....	.....	.....	9.00	11.00	.....	.....
Woodville, Ohio (f)	12.50	10.00	9.00	.....	9.00	10.00	9.00	1.50
SOUTHERN:								
Allgood and Saginaw, Ala.	12.50	10.00	.....	10.00	.....	1.35u	8.50	1.50
El Paso, Texas	.....	.....	.....	.....	.....	.....	10.00	1.75
Graystone, Wilmay and Landmark, Ala.	12.50	11.00	.....	11.00	.....	10.00	8.50	.....
Karo, Va.	.....	10.00	9.00	.....	.....	.....	7.00g	1.65h
Knoxville, Tenn.	20.50	11.00	.....	.....	.....	1.35	8.00	1.50
Ocala and Zubz, Fla.	12.50	12.00	10.00	.....	.....	.....	12.00	1.70
Varnons, Ala. (f)	.....	10.00p	10.00p	.....	.....	.....	8.00q	1.40r
WESTERN:								
Kirtland, N. M.	.....	.....	.....	.....	.....	.....	15.00	.....
San Francisco, Calif.	20.00o	20.00o	15.00o	20.00o	.....	.....	14.50	2.15[1]

†50-lb. paper bags, burlap 24.00; (a) run of kilns; (c) wooden, steel 1.70; (d) wood; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 200-lb. bbl.; 1.65, 300-lb. bbl., 2.65; (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 11.00; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) common, 2.50 plastering; 3.00 finishing; (u) two 90-lb. bags.

[1] to 2.40.

*Quoted f.o.b. New York.

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point,

Baltimore, Md.:		
Crude talc (mine run)	3.00@	4.00
Ground talc (20-50 mesh), bags		10.00
Cubes		55.00
Blanks (per lb.)		.08
Pencils and steel worners' crayons, per gross		.08 1.25
Chatsworth, Ga.:		
Crude talc		4.50
Ground talc (20-50 mesh) bags	7.00@	8.00
Ground talc (150-200 mesh) bags	8.00@	15.00
Chester, Vt.:		
Ground (150-200 mesh), bags	9.00@	15.00
Bags	10.00@	11.00
Chicago and Joliet, Ill.:		
Ground (150-200 mesh), bags		30.00
Dalton, Ga.:		
Crude talc		5.00
Ground talc (150-200) bags		10.00
Pencils and steel workers' crayons, per gross	1.00@	2.50
Emeryville, N. Y.:		
(Double air floated) including bags;		
325 mesh		14.75
200 mesh		13.75
Hailesboro, N. Y.:		
Ground white talc (double and triple air floated) including bags, 350 mesh	15.50@	20.00
Henry, Va.:		
Crude (mine run)	3.50@	4.00
Ground (150-200 mesh) ,bags	8.00@	14.00
Joliet, Ill.:		
Ground talc (150-200) bags		30.00
Keeler, Calif.:		
Ground (200-300 mesh), bags	20.00@	30.00
Natural Bridge, N. Y.:		
Ground talc (300-325 mesh), bags		13.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-70%	4.50@	5.00
Mt. Pleasant, Tenn.—B.P.L. 72%	5.50@	6.00
B.P.L. 75%	6.00@	6.50
B.P.L. 75% (free of fines for furnace use)	6.50@	6.75
Tennessee—F. O. B. mines, gross ton, unground Tenn. brown rock, 72% min. B.P.L.		5.50
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@	8.00

(Continued on next page)

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City or shipping point	Sizes 8x8x16	8x10x16	8x12x16
Columbus, Ohio	.17@.19†	.....	.27@29†
Forest Park, Ill.*	18.00	23.00	30.00
Indianapolis, Ind.	.12@.14†	.....	.....
Los Angeles, Calif.	4x3½x12—.03;	6x3½x12—.04½;	8x3½x12—.05½

*Price per 100 at plant. †Face.

Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

	10"x24"	12"x24"	15"x24"	18"x24"	24"x24"	30"x24"
Indianapolis, Ind.	.80	.90	1.10	1.30	1.70	2.70

Cement Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

	Hawthorne tile, Cicero, Ill. per sq.	—Cicero— Red	Green
Red Spanish	10.00		
Green Spanish	12.00		
Red French	9.50		
Green French	11.50		
Ridges		.25	.35
Hips		.20	.30
Ridge closers		.05	.06
Hip terminals, 3 way		1.25	1.50
Hip starters		.50	.60
Gable finials		1.25	1.50
Gable starters		.20	.30
End bands		.20	.30
Eave closers		.06	.08
Cement City, Mich. — 5"x8"x12", per M			55.00
Indianapolis, Ind.			
Gray			10.00
Red			12.00
Green			15.00

Pasadena, Calif.:	Per 100
4x4x12	$30.00
4x6x12	50.00
4x8x12	60.00

(Continued from preceding page)

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 68-72%	4.00@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 65%	6.50@ 7.00
Twomey, Tenn.—B.P.L. 65%	7.00@ 8.00

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	2.50
70% min, B.P.L., Basis 70%	2.75
72% min. B.P.L., Basis 72%	3.00
75/74% B.P.L., Basis 75%	4.00

Fluorspar

Fluorspar, 85% and over calcium fluoride, not over 5% silica, per net ton, f.o.b. Illinois and Kentucky mines	16.00
No. 2 lump, per net ton	19.00
Fluorspar, foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Philadelphia, duty paid, per net ton	15.00@16.00
Fluorspar, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, per net ton, f.o.b. Illinois and Kentucky mines	32.50

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	.....	10.50
Brandon, Vt.—English pink and English cream	*11.00	*11.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries	.....	17.50
Crown Point, N. Y.—Mica Spar	.....(a)	10.00@12.00
(a) Includes bags.		
Easton, Pa., and Phillipsburg, N. J.—Green granite	12.00@16.00	16.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio	.....	4.00@18.00
Middlebrook, Mo.—Red	.....	20.00@25.00
Middlebury, Vt.—Middlebury white	‡9.00	‡9.00
Milwaukee, Wis.	.....	14.00@34.00
Newark, N. J.—Roofing granules	.....	7.50
New York, N. Y.—Red and yellow Verona	.....	32.00
Red Granite, Wis.	.....	7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Calif.—"Natrock" roofing grits	.....	12.00
Tuckahoe, N. Y.	.....	12.00
Villa Grove, Colo.	.....	13.00
Wauwatosa, Wis.	.....	16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L. Less than C.L., 15.50.
*C.L. including bags; L.C.L. 14.50.
‡C.L. including bags; L.C.L. 10.00.

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	16.00@16.50	22.00@50.00
Ensley, Ala. ("Slagtex")	12.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Milwaukee, Wis.	15.00@16.00	30.00@42.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	10.00	
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	17.00	23.00@58.00
Prairie due Chien, Wis.	14.00	25.00@32.00
Rapid City, S. D.	18.00	25.00@45.00
Watertown, N. Y.	20.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00

†Gray. ‡Red.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass.	14.00@15.50
Brighton, N. Y.	16.75
Dayton, Ohio	12.50@13.50
Detroit, Mich.	14.00@15.00
Farmington, Conn.	14.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	14.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.00
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.00
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Syracuse, N. Y.	16.00@18.00
Terra Cotta, D. C.	13.50
Wilkinson, Fla.-White	12.00
Buff	16.00

Gray Klinker Brick

El Paso, Texas	13.00

Lime

Warehouse prices, carload lots at principal cities..

	Hydrated, per ton Finishing	Common
Atlanta, Ga.	22.50	14.00
Baltimore, Md.	24.25	17.85
Boston, Mass.	20.00	13.50@15.00
Cincinnati, Ohio	16.80	14.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	20.00	.....
Denver, Colo.	24.00	.....
Detroit, Mich.	12.40	12.40
Kansas City, Mo.	19.50	18.50
Los Angeles, Calif.	.....	18.00
Minneapolis, Minn. (white)	25.50	21.00
Montreal, Que.	.....	21.00
New Orleans, La.	24.00	16.00
New York, N. Y.	18.20	12.00@13.10
Philadelphia, Penn.	23.00	16.00
St. Louis, Mo.	23.00	19.00
San Francisco, Calif.	.....	22.00
Seattle, Wash. (paper sacks)	24.00	.....

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Atlanta, Ga.	.....	2.75*
Baltimore, Md. (10c discount)	.....	2.75*
Birmingham, Ala.	.....	2.50*
Boston, Mass.	.....	2.63
Buffalo, N. Y.	.....	2.48
Cedar Rapids, Iowa	.....	2.44
Charleston, S. C.	.....	2.75*
Cheyenne, Wyo.	.86½	3.46
Cincinnati, Ohio	.....	2.47
Cleveland, Ohio	.....	2.39
Chicago, Ill.	.....	2.20
Columbus, Ohio	.....	2.44
Dallas, Texas	.48¾	2.15
Davenport, Iowa	.....	2.39
Dayton, Ohio	.....	2.48
Denver, Colo.	.66¼	2.65
Detroit, Mich.	.....	2.35
Duluth, Minn.	.....	2.19
Indianapolis, Ind.	.....	2.39
Jackson, Miss.	.....	3.00*
Jacksonville, Fla.	.....	2.75*
Jersey City, N. J.	.....	2.73
Kansas City, Mo.	.....	2.17
Los Angeles, Calif.	.63	2.52
Louisville, Ky.	.....	2.45
Memphis, Tenn.	.65	2.60
Milwaukee, Wis.	.....	2.35
Minneapolis, Minn.	.....	2.42
Montreal, Que.	.....	1.90
New Orleans, La.	.....	2.80*
New York, N. Y.	.....	2.25
Norfolk, Va. (10c discount)	.....	2.75*
Omaha, Neb.	.....	2.86
Philadelphia, Pa.	.....	2.71
Pittsburgh, Penn.	.....	2.19
Portland, Ore.	.67½	2.70
Reno, Nevada	.75¼	3.01
Richmond, Va. (10c discount)	.....	2.87*
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	.....	2.71*
Savannah, Ga.	.....	2.75*
St. Louis, Mo.	.....	2.30
St. Paul, Minn.	.....	2.42
Seattle, Wash. (10c discount)	.....	2.65
Tampa, Fla.	.....	3.00*
Toledo, Ohio	.....	2.40
Winston-Salem, N. C.	.....	3.19*

NOTE—Add 40c per bbl. for bags.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	.....	1.95
Chattanooga, Tenn.	.....	2.45*
Concrete, Wash.	.....	2.35
Davenport, Calif.	.....	2.05
Hannibal, Mo.	.....	2.05
Hudson, N. Y.	.....	2.45*
Leeds, Ala.	.....	.....
Mildred, Kans.	.....	2.35
Nazareth, Penn.	.....	1.95
Northampton, Penn.	.....	1.95
Steelton, Minn.	.....	2.00
Universal, Penn.	.....	1.95

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths. 6'-10', 1850 lb. Per M Sq. Ft.
Centerville, Iowa	3.00	12.00	12.00	9.00	10.00	10.50	11.00	.....	25.80	11.00	.....	.....	.....
Douglas, Ariz.	.....	.....	7.00	.....	.....	15.50d	18.50	.....	30.00	15.50	.....	.....	.....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	.....	26.55	20.00	.....	.....	.....
Gypsum, Ohio‡	3.00	4.00	6.00	8.00	9.00	9.00	.....	7.00	27.00	18.00	20.00	20.00	30.00
Hanover, Mont.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles, Calif.	.....	.....	.....	8.00b@10.40c	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	.....	16.40	.....	17.40	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	18.00a	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ‖to 12.00; ‡prices per net ton, sacks extra; (a) to 21.00; (b) net; (c) gross.
(d) Hair fibre.

New Machinery and Equipment

New Half-Yard Crane and Shovel

THE Byers Machine Co., Ravenna, Ohio, are announcing a new ½-yd. "Bear Cat" gasoline shovel and crane. It has a 40-h.p. Hercules motor and full caterpillar mounting. The views herewith give a good idea of its size and scope.

New half-yard crawler shovel crane

Same machine equipped for excavation as a shovel

Crusher Bearing Problems

"THERE are few machines in which the bearings undergo greater hardship than in rock crushing and cement machinery" is the statement made by the manufacturers of "Syracuse Babbitts," in a booklet lately issued by that company. Another statement reads, "It is not safe to recommend one kind of babbitt for all kinds of crushers nor for all crushers of the same type." The selection of the proper babbitt depends upon various conditions as they may exist in different plants as well as the character of the rocks crushed.

This booklet contains information and advice as to the character of babbitt best adapted to certain conditions. Where a crusher is in good condition and the rock is not of extreme hardness, a tough babbitt is recommended. Where the crusher is in good condition and the rock is of extreme hardness, a hard, strong babbitt is preferable. When the crusher has worn parts that add to the pressure or the shock on the bearing, or where a bent shaft can not very well be replaced or repaired, a specially hard babbitt will vary probably hold up and last through a season. Another bit of advice, which if followed may save a lot of trouble is, when rebabbitting a crusher, run it empty for at least two hours.

There is other information to be found in the booklet, including a method for pouring, the proper pouring temperature for each babbitt, lubrication of the various bearings, etc. The booklet will be sent on request without charge to all who may be interested by the United American Metals Corporation, 196 Diamond street, Brooklyn, N. Y.

New Dorr Thickener

THE Dorr Co., New York City, has recently placed on the market an improved type of thickener, known as the Dorr "Traction Thickener."

The action of the thickener is similar to that of the universally known Dorr machine, but the mechanism of the new type is equipped with peripheral drive and is simple in operation and of extremely rugged construction. The Traction type has been thoroughly demonstrated for some time past in several large installations, but is now available in the smaller sizes as well as the large for application to thickening and dewatering problems in the metallurgical, chemical and industrial fields.

The "Traction Thickener" will be on exhibition at the Dorr Co. booth in the forthcoming Chemical Exposition at Grand Central Palace, New York, which lasts from September 28 to October 3.

Northwest Adds Gooseneck Boom to Equipment

THE Northwest Engineering Co., builders of gasoline and electric shovels, cranes and draglines, have developed a gooseneck boom for handling material to piles.

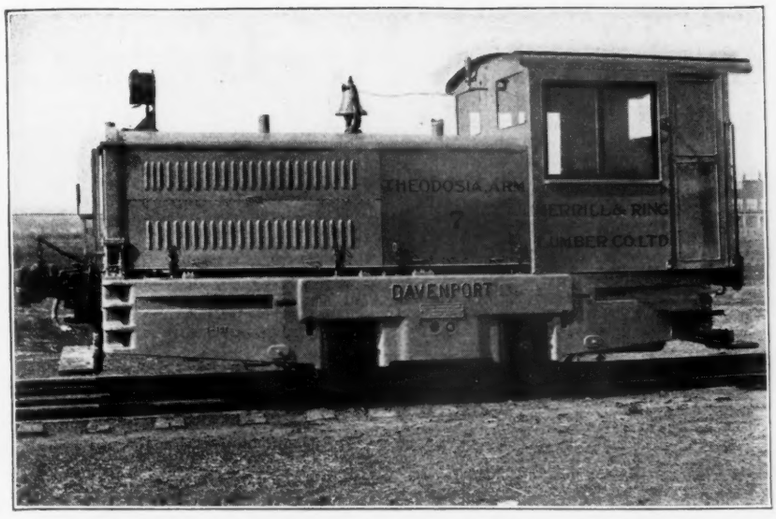
This machine is capable of handling heavy weights with a hook-block magnet, timber tongs or log grapple, as well as a clam-shell or other type of bucket.

The boom is of the lattice type, a type which has proved successful in every field of use. A single line is used for hoisting and the boom is made live by putting the boom hoist cables over a second drum. Large sheaves reduce the wear on cables, the boom hinges are large and sturdy, well able to withstand the strain of heavy loads, according to the manufacturers.

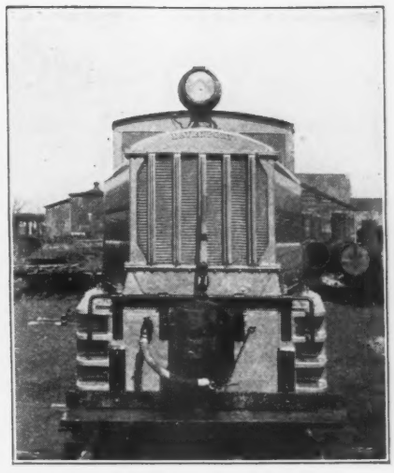
Such a machine is able to operate in narrow alleyways, between stockpiles for instance, and still give clearance to high piles. Thus it is able to stack materials or unload them to cars from positions where a machine with a straight boom could not work.

This machine is equipped with either gas or electric power. One man controls every operation from the seat in the cab and without the aid of a ground man. As it is mounted on crawlers it is able to go to any part of the yard and is not confined to tracks.

Easy operation is made possible by means of the simple arrangement of the control levers and the "feather-touch" clutch control, a device which utilizes the power of the engine for shifting the clutches.



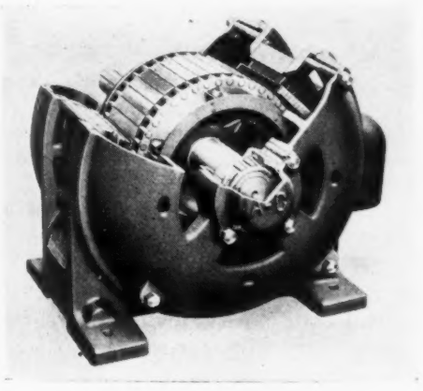
Long, low hung and powerful, the design of this new 20-ton gasoline locomotive is an example of the marked tendency on the part of locomotive manufacturers to improve the lines of their product



The low, slightly tapering hood and assive under-frame give the appearance of balance and power

New Line of Heavy-Duty Electric Motors

AFTER two years of experimental and development work, the Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has placed on the market a complete line of 25- and 60-cycle squirrel-cage and slip-ring induction motors equipped with Timken tapered roller bearings. This is in addition to the company's well-known line of sleeve bearing motors. The Timken bearing was selected, according to the Allis-Chalmers announcement, only after very careful consideration of the many questions of design and operation. After designs of bearings and mountings had been made, a number of motors of various sizes were built and tested under actual operating conditions of belt, gear, chain and coupled drives, a sufficient length of time to insure satisfactory service before the line of motors was offered to the trade. The Timken tapered roller bearing has been used because of its ability to withstand continued heavy radial and thrust loads without undue heating or appreciable wear. It is particularly suited to heavy service and will operate satisfactorily at the high speeds found in the general purpose induction motor. Because of the rolling action of the bearing, there is practically no wear so that the factory adjusted air gap is maintained indefinitely, eliminating any possibility of the rotor striking the stator.



New type of roller-bearing motors

The important question of lubrication is greatly simplified, as grease is used requiring very infrequent attention on the part of the operator. This is a very important point, because it has been found from experience, that a great many motor troubles can be traced to improper lubrication. The bearings have grease tight enclosures effectively excluding dirt or abrasive matter that might cause undue wear of the bearings. The mounting of the bearings is very simple, being only a light press fit for both the cone and cup, and not requiring the use of a lock nut or other means of holding the races in place. This also facilitates the removal of the bearings whenever necessary.

Tried Out on Crushing Machinery

In addition to the bearings, special attention has been given to many other features of design of this line of motors. This motor has to meet the many severe conditions found in its application to the various types of machinery manufactured by the company. The frame is made of steel with feet cast integral, to withstand shocks encountered in use with crushers, grinders and other machinery. In applying the motors to centrifugal pumps, very often severe conditions of moisture are met so that the coils are thoroughly insulated and baked in a waterproof varnish. In cement mills, motors must operate in some dusty and dirty locations, so that the scheme of ventilation must successfully meet these conditions. The openings in the housings and frames for ventilation, are so placed in vertical planes, that falling objects cannot enter the motor. The roller bearing motor is particularly adapted to many applications because the overall length is considerably less than for a sleeve bearing machine. This line of motors is especialy designed to meet the exacting requirements of application to the company's own machinery.

This motor equipped can now be obtained in all ratings, 25- and 60-cycle, 200-h.p. and smaller.

Better Lines in Gasoline Locomotives

A DECIDED tendency toward more attractive lines in gasoline locomotive construction is seen in the new 20-ton model designed by the Davenport Locomotive Works, Davenport, Iowa. With the long, slightly tapering hood and all-steel cab resting on a rugged, well-designed under-frame, an appearance of balance and power is achieved that is in keeping with the service a machine of this type renders. All the parts and units in this new design are placed with efficiency and accessibility as the most important consideration. All working parts are enclosed and protected from dirt and the weather, but arrangement is such that inspection or adjustments can be made quickly and easily.

Roller-chain transmission has been adopted since it reduces friction and wear to a minimum, gives higher mechanical efficiency, and furnishes a semi-elastic driving medium that protects the entire mechanism from shock. The four driving wheels have steel tires and are individually driven on four short axles of large diameter riding in Timken roller bearings which take both the side thrust and weight of the locomotive. This individual wheel drive gives remarkable tracking qualities, each wheel acting independently to hold the rail under all conditions.

This new model is equipped with self-starter, Westinghouse air brakes and electric lighting for the headlight and cab. A six-cylinder Climax engine is used, and the design makes all parts instantly accessible, it is claimed.

National Safety Council Meeting at Cleveland

THE Fourteenth Annual Safety Congress at Cleveland, Ohio, September 28-October 2, will be of particular interest and significance to rock products producers, for the quarry industry will take an active part, for the first time. The Portland Cement Association's accident prevention bureau has long taken part in these congresses, and this year there will be an interesting Cement Section meeting, for which the following program has been arranged:

Tuesday Morning, September 29, at 10 o'Clock, Cleveland Hotel

1. Reports of officers and committees.
2. Appointment of nominating committee.
3. June No-Accident Month Campaign—*H. G. Jacobsen,* manager, Bureau of Accident Prevention and Insurance, Portland Cement Association, Chicago, Ill.—*Discussion.*
4. Fatal Accidents—(Are they due to faulty mechanical equipment or appliances, or to carelessness, or both and how we prevent them.)
5. A Year Without Accidents and How We Did It.
6. Election of officers.

The chairman of the Cement Section is Henry A. Reninger, special representative, the Lehigh Portland Cement Co., Allentown, Penn., and the secretary is H. G. Jacobsen, manager of the Bureau of Accident Prevention and Insurance, Portland Cement Association, Chicago.

There will be a joint meeting of the Cement Section with the newly organized Quarry Section with a program as follows:

Wednesday Morning, September 30, at 10 o'Clock, Cleveland Hotel

1. Safety in the Use of High Explosives—*Lt.-Col. George R. Spalding,* Corps of Engineers, U. S. Engineer Office, Louisville, Ky., and *F. F. McLaughlin,* France Stone Co., Toledo, Ohio.—*Discussion.*

The Quarry Section will hold another session, for which the following program has been arranged:

Thursday Morning, October 1, at 10 o'Clock, Cleveland Hotel

1. Reports of officers.
2. Appointment of nominating committee.
3. Hazards of Standard and Narrow Gauge Railroad Equipment in Quarries—*R. N. Winkle,* consulting engineer, Cedar Rapids, Iowa.—*Discussion.*
4. Safety in Stone Quarrying and Crushing Plants—*T. P. Kerns,* chief inspector, Workshops and Factories Division, Industrial Commission of Ohio, Columbus, Ohio.—*Discussion.*
5. Safety in State Quarries—*C. A. Lowry,* Auld and Conger Co., Cleveland, Ohio.
6. Election of officers.

E. E. Evans, of the Whitehouse Stone Co., Toledo, Ohio, is chairman of the Quarry Section. D. C. Souder, insurance manager, the France Stone Co., Toledo, is secretary. The Quarry Section was organized on April 29, 1925, at Toledo, under the auspices of the Toledo Safety Council. There were present at this meeting: H. C. Ellis, Ohio and Michigan Sand and Gravel Co., Toledo; G. G. Black, France Stone Co., Toledo; F. F. McLaughlin, France Stone Co., Toledo; F. M. Singer, United States Gypsum Co., Gypsum; E. J. Lintner, United States Gypsum Co., Gypsum; J. A. McCall, Tarbox & McCall Stone Co., Findlay; F. J. Wertel, National Mortar and Supply Co., Gibsonburg; D. C. Souder, France Stone Co.; T. P. Ward, Kelly Island Lime and Transport Co., Clay Center; H. A. Johnston, the Ohio Marble Co., Piqua; L. D. Koontz, France Stone Co., Maumee; Joseph R. Reaser, Ohio Hydrate and Supply Co., Woodville; Fred Rutschow, National Marble and Supply Co., Gibsonburg; Chas. R. Pomeroy, Toledo Machine and Tool Co., Toledo; J. F. Neary, local Industrial representative of the Industrial Commission; H. T. McAndrew, Industrial Commission, Columbus; O. L. Shumard, Sandusky Cement Co., Silica; O. R. Greene, France Stone Co., Monroe, Mich.; J. E. Brunner, Kelly Island Lime and Transport Co., Clay Center; H. C. King, Hercules Powder Co., Waterville; A. H. Klein, Toledo; J. R. Hesser, Commissioner of Inspection, Toledo; H. B. Srodes, Chicago; E. P. Usher, Industrial representative of the Willys Overland Co., Toledo; R. J. Wall, Toledo; E. E. Evans, Whitehouse Stone Co., Toledo; G. Woods, France Stone Co., Waterville; Arthur La Motte, manager, Technical Division, the E. T. du Pont de Nemours & Co., Wilmington, Del.; H. L. Kilian, signal supervisor, New York Central R. R., Toledo; Dr. Paul M. Holmes, Toledo, and Jay E. Thompson, secretary of the Toledo Safety Council.

Secretary Souder, in a letter to the editor, states: "You are, of course, somewhat familiar with the activities of the writer in endeavoring to have something worked out for the prevention of accidents in and about stone quarry and crushing operations. Some years ago we attempted this at Columbus, Ohio, and you were present at this meeting and accompanied the party to one of the plants of the Marble Cliff Quarries Co.

"Jay E. Thompson, secretary of the Toledo Safety Council, must be given a lot of credit for seeing this thing through. When Mr. Thompson became secretary of the Toledo Safety Council, I called on him, and in our conversation I made the remark that it appears that the Safety Councils are striving to prevent accidents in the streets of the various cities and forgetting some of the outside industries. Of course, this remark started something and the result is already known.

"Our activities up to this time have been very few—we are merely treading water until the meeting of the National Safety Council in Cleveland in September. The management of the France Stone Co. is very enthusiastic over this and it has carried this on down to the workmen at the plants and have organized a Safety Committee at each of its plants."

Local Authorities Seek to Prevent Blasting

CLAIMING that the Bettendorf Stone Co. of Moline, Ill., is violating a city ordinance every time it fires a blast at the Cady stone quarry, 3409 Fourth avenue, Mayor C. W. Sandstrom has issued orders prohibiting the company from using explosives of any kind in its operation of the quarry. This order, it is declared, virtually puts the company out of business. This action was made following protests by property owners in the vicinity that the blasting operations were generally followed by a shower of rock that was dangerous to life. Otto Thompson, manager of the company, declared that the company had the right to carry out blasting operations under the permit granted by former Mayor Skinner. P. R. Ingleson, city attorney, stated that this permit is now invalid and only by special permit can further operations be carried out. In the opinion of Mayor Sandstrom, blasting would be permitted if the company would put up substantial bond to protect the city in case of accident. At the quarry it was said that further blasting would be done several hundred feet back from the tunnel mouth, thus eliminating any danger.

Ten men are now employed at the quarry. Limestone, used as fertilizer, crush and foundry stone are being taken from the main tunnel which extends underground a distance of 300 ft.

The entire question will be fought out at the next council meeting which occurs in a short time.—*Moline (Ill.) Dispatch.*

Hillsdale Gravel Company in Operation

AFTER three months of construction the Hillsdale Gravel Co. of Sweetwater, Texas, has turned out its first supply of washed and screened gravel. The plant is modern with a 46-ft. tower and a 24-in. conveyor belt, 335 ft. on centers. The siding is 2000 ft. long and connects to a main line railroad. The company owns 256 acres of high grade gravel land, tests showing but 3½% of foreign matter. Cost of the plant is estimated at $30,000 and the present rate of production about 500 tons of crushed rock per day. It is under the management of Marvin Hood.—*Sweetwater Republican.*

Roller Bearing
ALLIS-CHALMERS MOTORS

ALLIS-CHALMERS protects motor users with the strength and accuracy of electric steel frames and distortionless cores. Allis-Chalmers insures motor life with the silver-brazing process on rotor bars, with special baked insulation, with true uniform cooling. And now the advantages of anti-friction bearings are also obtainable in Allis-Chalmers electric motors. The established Allis-Chalmers line is rounded out with Allis-Chalmers induction motors, equipped with Timken Tapered Roller Bearings.

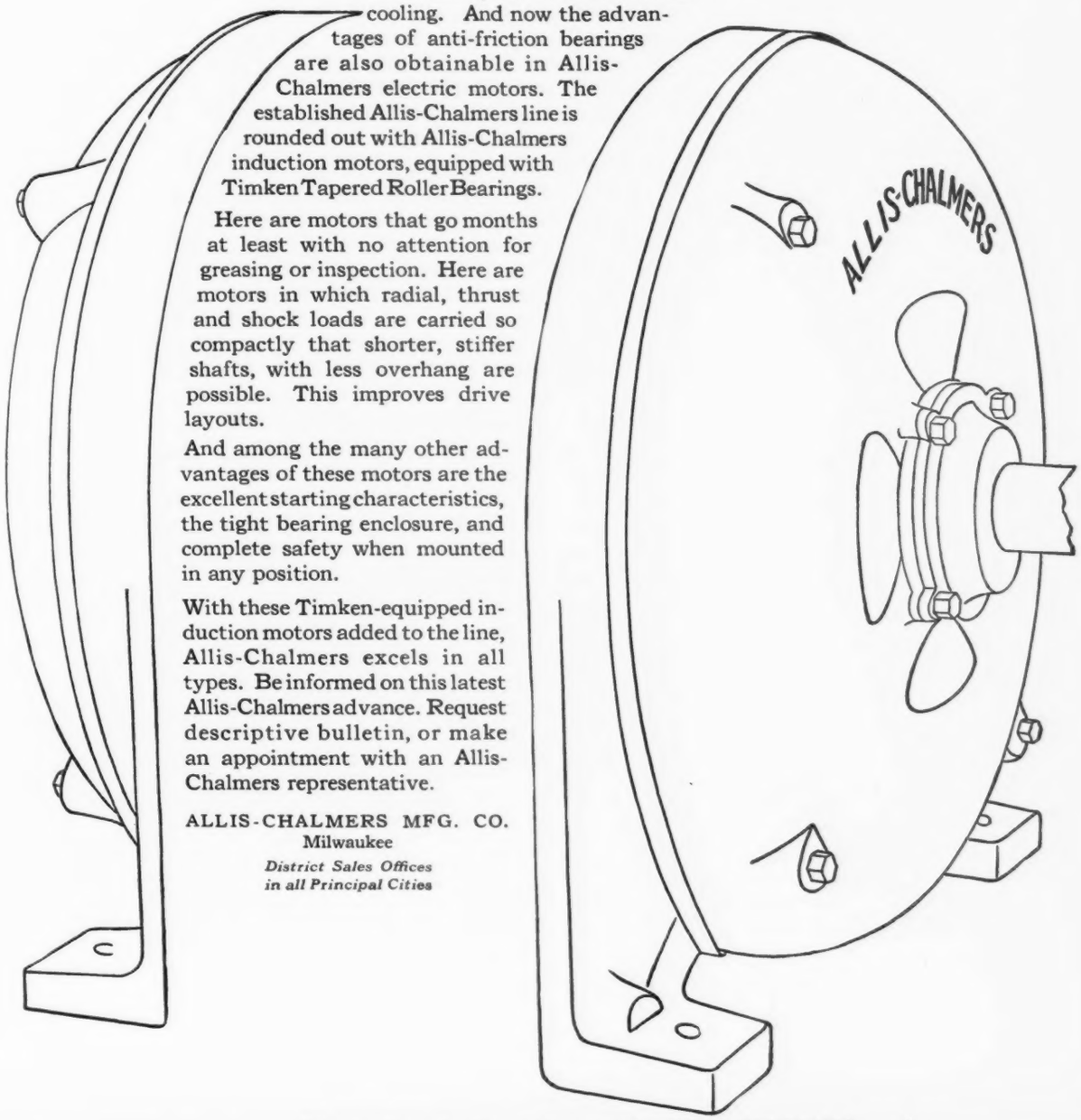
Here are motors that go months at least with no attention for greasing or inspection. Here are motors in which radial, thrust and shock loads are carried so compactly that shorter, stiffer shafts, with less overhang are possible. This improves drive layouts.

And among the many other advantages of these motors are the excellent starting characteristics, the tight bearing enclosure, and complete safety when mounted in any position.

With these Timken-equipped induction motors added to the line, Allis-Chalmers excels in all types. Be informed on this latest Allis-Chalmers advance. Request descriptive bulletin, or make an appointment with an Allis-Chalmers representative.

ALLIS-CHALMERS MFG. CO.
Milwaukee

District Sales Offices in all Principal Cities



News of All the Industry

Incorporations

National Gypsum Co., Dover, Del., $10,000,000. (U. S. Corporation Co.)

Dutchess County Lime and Mfg. Co., New York, $2,500,000. (U. S. Corporation Co.)

California Stucco Products Co., Philadelphia, Penn., $100,000. Manufacture stucco, etc.

Cadd Granite Co., Boone, Iowa, $25,000. By E. L. Cadd, Emil O. Bolt and others.

Southern States Mica Co., Atlanta, Ga., $1,250,000. By C. M. Colley, S. N. Goodman and others.

Funk Stone and Gravel Co., Shelby, Wis., $70,000. Edward A. and William F. Funk, E. C. Hinds.

Louisiana Portland Cement Co., Wilmington, Del., $10,000,000. Deal in cement and concrete of all kinds.

Sacramento Tile and Marble Co., Sacramento, Calif., $20,000. By F. C. DeCamp, John DeCamp and S. H. Jones.

Good Rock Mining Co., Micaville, N. C., $100,000. Edward Blake, Micaville, and N. S. Blake, Mt. Hope, W. Va.

Standard Sand and Gravel Co., Wilmington, Del., $250,000. (Corporation Service Co.) S. L. Mackey, Wilmington.

Kansas City Duntile Co., Kansas City, Mo., $50,000. By J. L. Strandberg, O. H. Swearingen, 604 Ridge Arcade, and others.

City Cement Block Co., Cranston, R. I., 100 shares of no par value. Joseph Zabatta, F. P. Smoki, D. Cardi and D. Iannon, all of Cranston.

Fred H. Albee, 40 East 41st street, New York, has organized a company to establish a plant at Venice, Fla., to manufacture concrete construction slabs.

Madras Syndicate, Elmira, N. Y., $1,000,000. Quarrying and construction. W. J. W. Huff, F. Crounse, D. S. Breuzel. Attorney, H. W. Turner, Troy, N. Y.

Rock Asphalt and Construction Co., Buffalo, N. Y., 6000 shares of $100 par; 3000 common, no par. F. G. Hengeren, H. W. Barnett, C. R. Orange. (Attorney, H. E. Webster, Buffalo.)

South River Sand Co., Elizabeth, N. J., $100,000.. M. S. Wright, Jr., of South River, N. J., and Clinton Gilbert, George Schmidt, Jr., of Elizabeth, N. J. (Attorney, George Schmidt, Jr., Elizabeth.)

Midway Sand and Gravel Co., Parkersburg, W. Va. (reported incorporated in June 13 issue). Granted authority to issue 400 shares common and 200 shares preferred stock, each in $100 denominations.

Keystone Foundations Co., Inc., Brooklyn, N. Y., $50,000. To manufacture cement blocks, brick, etc. Directors, J. L. Becker, 1309 avenue O, Brooklyn; I. Rosenberg, 1215 Grand Concourse, Bronx, N. Y.,; M. Greenberg, 141 Bennett avenue, Manhattan.

Lime

Austin White Lime Co., Austin, Texas, met with a $10,000 loss through fire at their McNeil, Texas, plant. Damage was confined to an old section of the plant and destruction of cooperage shop with its stock. A. H. Robinson, manager of the company, stated that work at the plant would go on as usual.

Sand and Gravel

Logan county, Ohio, commissioners have purchased a stone crusher of 200-yd. per day capacity at a price of $4150.

Moline Consumers Co., Moline, Ill., has petitioned the city for permission to build a switch track across city property to their plant.

Bell Sand and Gravel Co., Multnomah county, Ore., has been awarded the contract for 750 cu. yd. of gravel by the county commissioners. The price was 50 cents per yd.

C. H. Kelly has installed a gravel pumping outfit near McCook, Neb. Tests have shown a fine quality of gravel to be available near the river in the locality.

Wells county, Ind., has contracted for 15,000 cu. yd. of gravel to be excavated from pits near Keystone. Price to be paid is 60 cents per cu. yd. on the banks of the pit.

W. H. Meredith, Poplar Bluff, Mo., reported in August 22 issue as having secured permission to mine gravel on the Success river, Ark., is now preparing to purchase equipment for the plant to be erected.

Arkansas Gravel Co., Arkansas City, Ark., is installing a washing and grading machine so as to grade the gravel and sand. The company hitherto has sold only ordinary concrete gravel and ballast.

Texas Sand and Gravel Co., Colorado, Texas, is reported to construct a $40,000 sand and gravel plant on the Colorado river. L. D. Eastland, 501 Amicable building, Waco, Texas, is president of the company.

Western Sand and Gravel Co., Spring Valley, Ill., established since 1909 has steadily grown and this year expects to produce over 100,000 tons of sand and gravel. The company owns 65 acres of high-grade gravel land.

National Sand and Gravel Co., Morrisville, N. J., under a modified order by Chancellor Walker, will be permitted to continue business pending the outcome of a receivership action brought by Hugo Spalinski, a stockholder and creditor. The original injunction prohibited the company from doing business until the question of solvency had been settled. Modification of this order followed a preliminary hearing before Chancellor Walker recently. William A. Moore is counsel for the company and J. Irving Davidson represents the complainant.

Union Rock Co., Los Angeles, Calif., has had its application for permission to establish a loading station for sand and gravel on its property near Vineyard station of the Pacific Electric Railway Co. held up by the city council planning committee for three weeks. A delegation of property owners who live near the proposed rock station protested against granting the permit on the ground that the noise of the loading of the trucks would be objectionable. The company recently oiled the roads leading to their bunkers under construction at Compton, Calif. This was done to settle the dust which was cause of complaint by residents in the vicinity.

Cement

Belgian cement to the extent of 66,000 sacks is due to arrive at Santa Barbara, Calif. The entire shipment of 3300 tons is for the Conwell Construction Co. of Santa Barbara.

Ideal Cement Co.'s plans for the new hotel and office building for their Ft. Collins, Colo., plant have been completed and contractors will soon be asked to bid on them.

Atlas Portland Cement Co., New York, has moved the sales offices of their Independence, Kans., plant from Independence to 608 Orear Leslie building, Kansas City, Mo.

Lehigh Portland Cement Co. of New York, has put 600 men to work on the erection of a new plant at Sandt's Eddy, Penn. There will be 23 buildings among which are eight silos 75x30-ft.

Kansas State Board of Administration awarded a contract for 10 carloads of cement to be used at the state penitentiary at Lansing to the Capital City Brick and Coal Co., of Topeka. Price accepted was $2.59½ per bbl.

Charles H. Hall, Chattanooga, Tenn., and others have completed plans for the erection of a 6000-bbl. cement plant. Kilns will be located on the Warrior river and finishing plants at Mobile, Ala., Tampa, Fla., and New Orleans, La.

Alabama portland cement plants are operating to capacity and shipments are greater than present production, what little warehouse stock left from last winter having been removed. Large amounts are being shipped into Florida, according to J. W. Johnston, vice-president of the Alabama Portland Cement Co.

Gypsum

U. S. Gypsum Co. is stripping a new deposit of gypsum rock near their Ft. Dodge, Iowa, plant.

U. S. Gypsum Co. has chartered the steamship Gaston for several consecutive trips from New Orleans, La., to Miami, Fla. It is expected that 10,000 tons of plaster will be shipped in this way.

Schumacher Wall Board Co., Los Angeles, Calif., is contemplating a new units at its plant at 6851 East Marginal way, Seattle, Wash., reported to cost $300,000 with machinery. John Schumacher, Sr., is president.

Plastoid Products Co., Los Angeles, Calif., have made additions to their tile department which are expected to triple the output of the plant. The hollow gypsum tile manufactured by the company was recently perfected and the increased volume of business has made enlargement of personnel and plant necessary.

W. D. Alt, C.E., 3212 Bowen street, Dallas, Texas, interested in development of potash, gypsum and soda deposits; work will include laying approximately 65 miles standard gauge railroad, including several bridges; wants catalogs and other literature on machinery and equipment for developments of this kind.

Cement Products

Worcester Concrete Block Co., Worcester, Mass., has plans for a one-story factory to cost about $45,000 with equipment.

Andrew Sundheimer and son have purchased the Pegg Cement Block and Vault Co. plant at 788 West Stitt street, Wabash, Ind.

San Joaquin Valley Cement Pipe Co., composed of S. Y. Mayes, Nettie H. Mayes and C. Balsa, which has been operating plants at Chowchilla, Herndon and Livingston, Calif., has been dissolved.

Sorrel Cement Co., Inc., has engaged in business at 400 High street, Oakland, Calif., and will manufacture building stucco cement. John S. Graham is president; F. A. Kaufman is vice-president, and H. F. Wierum, manager of the company.

Quarries

Shea and Donnelly, Bedford, Ind., have begun the stripping of a new quarry near Ellettsville, Ind.

Marble Mountain Quarry Co., Alpine, Texas, is about to install $15,000 of new machinery recently received.

East Quarry Co., Glencoe, Ala., has begun work on the complete electrification of its limestone quarrying plant.

McGilvay Stone Co., San Francisco, Calif., is reported to be planning the reopening of the Stites stone quarry near Maxwell, Calif.

Columbia Granite Works, Ortonville, Minn., operated by Emil Kaddatz and Son Co., have purchased a quarry near Millbank, Minn. It is expected to be put in operation within a short time.

Alberene Stone Co., New York, has opened a branch at 703 Grace American building, Richmond, Va., with W. M. Buchroeder in charge as southern manager. Their quarries are at Schuyler, Va.

Rib Mountain Granite Co., Marathon county, Wis., has been allowed the use of a quarry near the Wisconsin river to be purchased by the city of Waussau, Wis. The company will erect factory buildings on the site.

Crotch Island Granite Co., Stonington, Me., and the Crotch Island quarry of the Ryan-Parker Construction Co. have been combined and are to be transferred to the John L. Goss Corp. of Stonington, Me., and Boston who are now operating adjoining quarries. All equipment is included in the amalgamation and the output of the combined quarries is said to be the largest of any single granite quarry in the United States.

Soapstone

Standard Soapstone Co., Arrington, Va., plans to erect mill and install machinery to manufacture soapstone. Railroad connection to Arrington or Norwood to be built.

Slate

C. F. Herford, Tellico, Tenn., is said to be interested in the development of a slate quarry, estimated cost between $500,000 and $1,000,000.

Phosphate

Morroccan phosphate sales during the first six months of 1925 have increased to 338,726 tons. Principal importers are Spain, 72,258 tons; France, 69,289 tons, and Holland, 42,500 tons.

Trade Literature

NOTICE—Any publications mentioned under this heading will be sent free unless otherwise noted, to readers, on request to the firm issuing the publication. When writing for any of these items kindly mention ROCK PRODUCTS.

Advance Machinery and Supply Co., Denver, Colo., have issued their first illustrated bulletin in which operation methods of the mechanical stokers manufactured by them are described.

Whiting Corp., Harvey, Ill., Catalog No. 205, superseding Nos. 164 and 167; illustrates and describes trucks, turntables and trolley systems for industrial service manufactured by them. Lists other products made by them or subsidiaries. 24 pp., 8¾x11 in.

Loomis Machine Co., Tiffin, Ohio, catalog on blast hole, well drilling, boring, prospecting machinery and tools. Photographic illustrations showing machinery and the uses to which this equipment has been put. Details of construction of machinery, tools and various parts. Describes the types of power drilling machinery produced. Contains all bulletins and circulars published to date. 100 pp. 8x10¾ in.

Gifford-Wood Co., Hudson, N. Y., Catalog No. 725 describing and illustrating the various types of wagon loaders, portable conveyors, bagging machinery, wagon chutes, rotary screens, yard screens, scoops, bags, etc. and full line of GW accessories made by the company. Includes specification for type portrayed. 96 pp. 6x9 in.

Blaw-Knox Co., Pittsburgh, Pa. New catalog entitled "Batcher Plant for the General Contractor." Contains illustrations and descriptions of batchers, inundators, mixing machinery, and other items made by them. Features portable proportioning and mixing plants and contains excellent data on methods of proportioning and measuring of concrete aggregate. 20 pp. 8½x11 in.

Watson-Flagg Engineering Co., Paterson, N. J., have issued a bulletin describing and illustrating W. F. Reduction Gear Drive machinery. It contains general data sheets, price lists and information which are of interest.

D. O. James Mfg. Co., Chicago, Ill., manufacturers of gears, spur gear speed reducers, worm gear speed reducers and couplings, announce their new general catalog No. 99 of 288 pages which covers their complete line of products.

It is fully illustrated and contains many pages of general engineering data which is of interest to engineers, designers and purchasers of transmission equipment concerning the designing and specification of drives for all kinds of elevating, conveying, power transmitting and process machinery.

Kuhlman Electric Co., Bay City, Mich., have issued a handbook on the electrical transformer. Text contains practical engineering data and facts for the electrical or consulting engineer. No reference made to company products in the data. It is called, "Thirty Years of Uninterrupted Service to the Electrical Industry."

Foote Bros. Gear and Machine Co., Chicago, Ill., have issued catalog No. 26 a new revised edition of the IXL Speed Reducer Book. This book contains considerable engineering information pertaining to the solution of problems involving spur and worm gear speed reducers. It is also replete with illustrations, tables, formulae, practical problems and general information of considerable interest to engineers and plant executives who have to deal with transmission gearing and speed reduction problems. Data and ratios, weights and prices of reducers is included. 80 pp. 8½x11 in.

Sullivan Machinery Co., Chicago, Ill., have issued bulletin No. 77N in which is described and illustrated types of portable gasoline engine driven compressors and pneumatic machinery. Class WK312 is a 2-cylinder vertical, direct connected to a 4-cylinder Buda engine and Class WK314 is a 220-ft., 4-cylinder V-type also operated by 4-cylinder Buda engine. Details concerning sizes, weights and methods of mounting are included. Fordson-operated type class WK34 and an electric-motor type, class WK32 are also illustrated.

Brown Instrument Co., Philadelphia, Penn., have issued catalogs No. 74 and 44. The first describes and illustrates the recording pressure and vacuum gauges, continuous recording pyrometers and gauges, clocks for equipment, charts, recording thermometers and electric CO_2 recorders, etc., manufactured by them. Specifications, prices and other data concerning equipment noted. 32 pp., 8x10½ in. No. 44 describes and illustrates indicating and recording tachometers for measuring or counting revolutions of driving shafts. Features single, duplex and multiple recording instruments. Includes description of mercurial recorder with unusual qualities. Price list for equipment and charts appended. 12 pp., 8x10½ in.

Manufacturers

Charles W. Momberger has resigned from the W. P. Heineken Co. of New York to enter in business with James K. Hooper. The firm name is Hooper, Momberger Co. and is located at 90 West street, New York City, suite 1703.

Hardinge Co., York, Penn., have arranged the showing of working models of Hardinge equipment at the Chemical Equipment Exposition, which is to be held in New York. Booth No. 60 with J. S. Halbert in charge, will show the Hardinge conical mill with the new reversed air current, Hardinge super-thickener, Hardinge rotary spray, Ruggles-Coles dryer. The super-thickener and spray are just being introduced.

McGann Manufacturing Co., York, Penn., has undertaken the construction of a Schulthese Hydrate Plant for Jorge Bird Arias, an extensive sugar manufacturer of Porto Rico who furnishes most of the lime for the Centrales and building operations in Porto Rico. All the equipment used in the plant will be made by the company and the erection, installation and putting plant into production will be taken care of by Claude J. Jones, Supt. of Lime and Hydrate plant construction, who recently sailed for Porto Rico with this purpose in mind. Within a short time after acquiring the rights to manufacture and sell the Schulthese Hydrator in North and South America the McGann Co. has sold seven complete hydrate plants in this country. These plants are being installed at Pierce City Lime Co., Pierce City, Mo.; F. D. Barnhart & Sons, Mt. Pleasant, Penn.; Jorge Bird Arias, Fajardo, Porto Rico; National Limestone Co., Naginey, Penn.; Blue Ridge Lime Co., Asheville, N. C.; Geo. M. Bushey & Sons, Caveton, Md.; Valley View Lime Co., Bellefonte, Penn.; Customers Community Builders, Ltd., Toronto, Ont. In addition there has been in operation for nearly two years a plant at Limeton Lime Co., Front Royal, Va.